GCDIS IMPLEMENTATION
1995

VOLUME II—AGENCY IMPLEMENTATION
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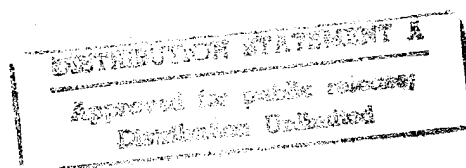
USGCRP

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THE DEPARTMENT OF COMMERCE IMPLEMENTATION PLAN FOR

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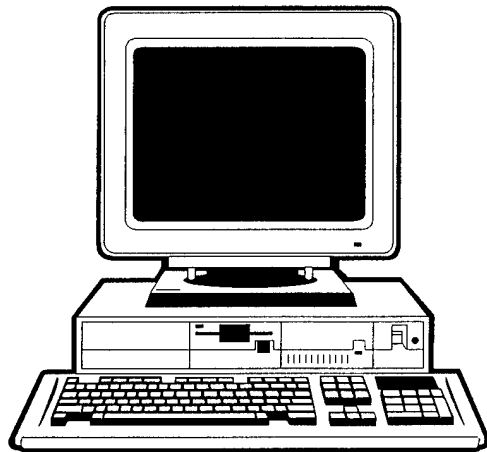
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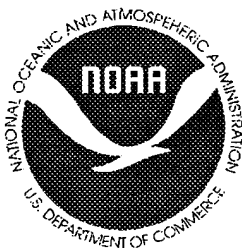
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JULY 1, 1995

DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC
   ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA,
   AND INFORMATION SERVICE

Contents

Executive Summary

The Department of Commerce's Global Change Data and Information System (GCDIS) Implementation Plan is one of nine agency-specific GCDIS Implementation Plans that has been prepared by the Federal departments participating in the development of the GCDIS. The interagency *GCDIS Implementation Plan* sets the stage for the agency plans and provides the background necessary to fully understand the program. The individual plans address the recommendations of the *1993 Data Forum* and attempt to better inform those who need global change (GC) data about the existence and availability of the such data.

Overall, the GCDIS strives to serve a diverse user community of global change researchers, policy makers, educators, private industry, and private citizens. It will aid the user community in learning what data and information are available, in having the key holdings available in useful forms with ready access, and in being assured of their quality and continued availability. It is an aggregate of existing and planned agency-mission-responsive data and information systems that have been made accessible to the GC user community. The ability for the systems to interoperate has been enhanced through the use of standards, common approaches, technology sharing, and data policy coordination.

The Department of Commerce (DOC) has more than two dozen data and information service nodes that provide data of interest to GC researchers. The Bureau of Census, the National Atmospheric Administration

(NOAA), and National Technical Information Services (NTIS) make available data sets that include not only traditional environmental data on the Earth system's atmosphere, oceans, and geology, but also nontraditional GC information on trade, economics, and demographic data from around the globe. DOC's environmental holdings contain descriptions of the Earth from its core out to the Sun with details covering decades and in some instances even going back hundreds of years.

Climate research requires a data vision that goes beyond the classical Earth system measurements such as temperature, winds, and trace species. When researchers model the carbon cycle in the atmosphere, they require additional data such as coal and energy production across the globe and over time. When they study ozone depletion in the upper atmosphere, they look to production figures for freon and other man-made substances that may interact with the ozone. And, to evaluate the shifts in observations at long-term climate measurement stations, they require data on population growth and patterns. These records of human movements and industrial activities help to clarify the anthropogenic influences on the planet.

Section IV of this Plan identifies those DOC information providers that wish to make their data assets available through their associated information service nodes to GC researchers and others. All information service nodes are described and their e-mail addresses and contact points are provided. Additional information on the general holdings, how to access the holdings, what interfaces are available, which standards are in use, and the availability of user assistance are also provided. Individual schedules are included showing the progression toward achieving full GCDIS access.

Section I
Introduction

The United States Global Change Research Program (USGCRP) was established to observe, understand, and predict global change, and to make its results available for use in policy matters. These broad-ranging responsibilities depend on a foundation of high-quality, relevant data and information. The data and information needs transcend traditional scientific discipline boundaries and range from geophysical and biological sciences to economic and social sciences. It is desired to make it as easy as reasonably possible for researchers and others to access and use global change data and information. To achieve this, the Federal agencies involved in the USGCRP have cooperated to organize the Global Change Data and Information System (GCDIS), which builds on each agency's mission and resources and links its data and information resources to those of other agencies and to the users. The GCDIS is being implemented by the participating agencies under the Interagency Working Group on Data Management for Global Change (GCDMWG).

The GCDIS strives to serve a diverse user community of global change researchers, policy makers, educators, private industry, and private citizens. It will aid the user community in learning what data and information are available, in having the key holding available in useful forms with ready access, and being assured of their quality and continued availability. It is an aggregate of existing and planned agency-mission-responsive data and information systems that have been made accessible to the GC user community. The ability for the systems to interoperate has been enhanced through the use of standards, common approaches, technology sharing, and data policy coordination.

The Department of Commerce (DOC) gathers, analyzes, and makes available many of the data sets and much of the information required by the global change user community as part of DOC's mission "to foster, serve, and promote the Nation's economic development and technological advancement."

DOC fulfills this mission through the following:

- Stimulating prosperity and growth of American business by providing timely information about business opportunities and economic trends at home and abroad.

- Gathering and publishing a wide variety of data about the people and economy of the Nation, including the decennial census.

- Exploring the oceans and atmosphere so as to predict behavior of weather, tides, and currents.

- Maintaining a worldwide environmental data system.

These mission activities are carried out throughout the agencies and bureaus of DOC, often involving other departments of the Federal government and private institutions as well as foreign governments. The resulting treasury of data and information is made available through units of DOC: the Bureau of the Census of the Economic and Statistical Administration (ESA), the National Oceanic and Atmospheric Administration (NOAA), and the National Technical Information Services (NTIS) of the Technology Administration. The data and information are distributed on a variety of media such as hard copy, compact discs, dial-in bulletin boards, and Internet-accessible on-line databases.

Purpose and Scope

This GCDIS Implementation Plan for DOC is intended to educate global change researchers and assist agency implementation teams. It provides pointers to the relevant data assets of the agencies and bureaus of DOC and to the information service nodes where the data and information about the data may be accessed. The DOC information service nodes of interest to the USGCRP are identified in Section IV, and general descriptions of their data assets are included there. The plan covers a 3-year period beginning with FY 1994. It will be updated each year to reflect the current 3-year period.

The user's ability to access data and information available through the information service nodes will undergo significant transformations over the remainder of the decade, because of the advances in technology and the changing needs of the users. The evolution of these levels of access has been described by generic standards for each of the functional areas, to ensure that the researchers depending upon the GCDIS for their data needs can take advantage of these advances. These levels are defined in Appendix B. A more complete definition can be found in the *U.S. Global Change Data and Information System Implementation Plan.* Schedules for the implementation of these access levels for each information service node are included in Section III, to assist the research in tracking these changes. These enhancements to the service nodes will be accomplished as part of the existing budget in response to DOC's national missions and attempts to implement new executive directives such as the National Spatial Data Infrastructure (NSDI), the Federal Geographic Data Committee (FGDC), and the Government Information Locator System (GILS).

Related Documents

The U.S. Global Change Data and Information Management Program Plan

Data and information management is an integrating priority of the USGCRP because this management directly affects the timeliness and quality of global change research. The GCDMWG prepared this Plan in 1992 for the Committee on Earth and Environmental Sciences (CEES). It provides a framework for an interagency approach to global change data management and commits the participating agencies to work with each other. The following agencies participated in the planning:

- Department of Agriculture

- Department of Commerce

- Department of Defense

- Department of Energy

- Department of Interior

- Department of State

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- Environmental Protection Agency

- National Aeronautics and Space Administration

- National Science Foundation

The U.S. Global Change Data and Information System Implementation Plan

The GCDMWG prepared this plan in 1994 at the request of the Committee on Environment and Natural Resources (CENR), the follow-on committee to CEES. Building on the Management Program Plan, this document defines a high level implementation strategy for the GCDIS. It defines the interagency mechanisms that will be established to coordinate the efforts of the individual agencies, overall time tables, and agency-by-agency overviews.

The plan defined the minimal requirements for agency participation as follows:

- Availability of data or information relevant to global change.

- Directory-level metadata describing these data or information.

- A credibly permanent commitment to maintaining these data and information, and making them available.

- Interoperability with the rest of the GCDIS sufficient to make its directory-level information accessible from any other GCDIS entity.

- User support for the data or information.

1993 Data Forum

The National Research Council's Committee on Geophysical and Environmental Data (CGED) was asked by the GCDMWG to review the draft *U.S. GCDIS Implementation Plan*. The CGED established four working groups to review and comment on the draft; documenting global change, understanding key processes, predicting global change, and assessing the implication of global

change. The 1993 Data Forum documents the working group presentations and the critiques by individual members. The draft Implementation Plan was revised by the GCDMWG as a result of these interactions and again reviewed by the CGED. Although the CGED is generally pleased with the changes, it noted that work remained in better defining the system access, the goals and milestones of the GCDIS, the specific roles of the participating agencies and users, and the financial needs of the GCDIS. The following three plans seek to address many of these remaining concerns.

Agency GCDIS Implementation Plan

Each of the participating agencies (listed in the Management Program Plan) identifies the information service nodes cooperating in the GCDIS, provides a high-level description of the data and information holdings relevant to GCDIS, and describes how the agency will implement its portion of the GCDIS over the next few years. These agency plans are complemented by cross-cutting Interagency Access Plan and Interagency Content Plan.

GCDIS Interagency Access Plan

This plan will define how the GCDMWG's Access Group will coordinate the agency's contributions into the federated system. It will identify the infrastructure required to link the GCDIS nodes between agencies and it will specify user access functionality.

GCDIS Interagency Content Plan

This plan will focus identifying on the data and information holdings of the participating agencies that are relevant to global change research. It will identify the highest priority global holdings and assist in the coordination necessary to make them available through the GCDIS.

Section II

Department of Commerce Overview

DOC provides a wide range of information services to business and to the public in carrying out its mission to ensure and enhance economic opportunities for the American people. In doing this, DOC is sensitive to business needs and consumer concerns as many of the these activities affect our daily lives. For example, NOAA monitors the Earth system, forecasts the weather, and archives vast quantities of environmental data and information, the Bureau of the Census provides statistical information about the Nation that businesses and governments use in making decisions that affect all of us, and NTIS has established an electronic marketplace to make a wide range of U.S. and Foreign government information available to business and individuals alike. These and other offices in DOC provide a wealth of information and assistance to the public and to anyone considering starting a business or conducting research. The Bureau of the Census, NOAA, and NTIS are the chief DOC contributors to U.S. GCDIS.

Bureau of the Census

The Bureau of the Census is one of four major organization of DOC's Economics and Statistics Administration, which makes available to the public much of the statistical, economic, and demographic information collected by the Federal Government . These organizations are involved in the collection, analysis, interpretation, and distribution of facts describing many features of our Nation, from the size of our population to the sales and profits of a particular industry.

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The Bureau of the Census is the principal statistical agency of the Federal Government. It collects, compiles, and publishes statistics on business, construction, housing, population, and many other subjects. The Bureau is responsible for taking all the censuses authorized by law, including those of population, housing, agriculture, retail and wholesale trade, service industries, manufacturers, mineral industries, transportation, construction industries, and governments. The Census Bureau also conducts approximately 200 sample surveys on a monthly, quarterly, and annual basis. These surveys encompass some of the same subjects as the censuses, providing current information on social and economic conditions.

Demographic and trade data from the Bureau of the Census archives are required by Global Change researchers to estimate the anthropogenic influences on Earth system observations. Local perturbations such as growth or shifts in population densities along with changes in agricultural and industrial activity can have a significant effect on long term measurements. Knowledge of these events also assists in identifying the forcing functions for many local changes.

National Oceanic and Atmospheric Administration

NOAA conducts research and gathers data about the oceans, atmosphere, space, and sun, and applies this knowledge to products and services that benefit all Americans as well as foreign users of NOAA services. NOAA warns of dangerous weather, charts the seas and skies, guides the use and protection of ocean resources, and helps plan for the future by enriching understanding of the complex physical environment.

NOAA provides services through five line offices:

- National Environmental Satellite, Data, and Information Service

- National Ocean Service

- National Marine Fisheries Service

- National Weather Service

- Office of Oceanic and Atmospheric Research

and three cross-cutting program offices:

• Coastal Ocean Program

• Global Programs

• High Performance Computing and Communications

NOAA's environmental data services are provided to users through Information Services Nodes (ISN) located across the Nation. These ISN are repositories for Earth system observations from around the world along with analyses and information products created from the data. The ISN contain significant expertise in the individual data sets and have generated high quality integrated science data sets at most of the ISN. NOAA operates three National Data Centers, and approximately 30 Centers of Data. The National Data Centers are responsible for safeguarding the Earth system measurement for future generations as well as providing current data and information services. Centers of Data usually focus on more specialized sub-discipline or phenomena. Together they provide a full spectrum of environmental data and information services to the Nation.

National Technical Information Service

NTIS is a Federal agency within DOC's Technology Administration. It is a self-supporting agency that actively collects and organizes technical, engineering, and business-related information generated by U.S. and foreign sources and makes it available for commercial use in the private sector. The NTIS collection includes more than 2 million titles. These works cover current events, business and management studies, translations of foreign reports, foreign and domestic trade, general statistics, the environment and energy, health and the social sciences, and virtually hundreds of other areas.

Section III

DOC Data and Information Management

DOC is committed to "carry out the necessary fundamental research and develop appropriate technologies to detect and correct environmental problems, to manage natural resources, and to sustain the environment." Specific DOC data and information management responsibilities are distributed amongst the various agencies and Bureaus of the Department. Specific data management issues relating to the GCDIS, that are closely linked to global change research programs, are mainly based in NOAA. Examples are NOAA's Climate and Global Change Program (C&GCP), the U.S. Weather Research Program (USWRP), and NOAA's 1995-2005 Strategic Plan elements of Implementing Seasonal to Interannual Climate Forecasts and the Predicting and Assessing Decadal-to-Centennial Change. They provide the management and policy structure to identify global change data and information needs, integrate them with environmental measurement and science programs, and assist the National Data Centers and Centers of Data in establishing priorities.

DOC also works closely with the university community and other Federal environmental agencies to ensure that the needs of global change researchers throughout the Nation are adequately addressed as part of the ongoing programs. DOC looks to meld the advice from these groups with a number of long-established advisory groups that assist DOC in setting individual priorities for the environmental, economic, trade, and demographic data holdings of the Federal government.

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DOC as a major contributor to the GCDIS, has strong synergism between its general mission and the particular needs of the global change program. While no focused funding is available within DOC's budget, a significant overlap in program goals makes DOC a major contributor to achieving the goals of GCDIS. Over the next few years DOC will make considerable progress toward meeting full GCDIS Access functionality.

Management Structure

The USGCRP has defined four themes - 1) documenting global change, 2) understanding key processes, 3) predicting global change, and 4) assessing implications of global change - to establish the framework in which to manage C&GC activities. Within these themes, DOC manages a number of operational and research programs that have a significant impact on developing procedures and establishing guidelines for the collection, preservation, and distribution of global change data and information by the Information Service Nodes.

Individual agency strategic plans are developed in response to government policies and priorities on environmental issues such as Global Change. These plans support the budget process that establishes the necessary critical/high priority programs. The guidelines provided by the IPCC, and other international commitments are considered in the formulation of programs. These DOC programs, acting with an in-depth understanding of global change policy issues under study, translate the high level directions into specific tasks and efforts. Priorities for data and information products are identified through the use of program workshops including participants from university, private sector, and government science groups, and the use of national and international discipline panels.

Highlights of the major research efforts (NOAA's C&GCP, USWRP), Seasonal and Interannual Forecasts, and Decadal-to-Centennial Predictions, and The Bureau of the Census's Global Change Joint Venture Projects) that are pertinent to GCDIS planning are provided.

NOAA's Climate and Global Change Program

The Information Management element of NOAA's Climate and Global Change Program provides the scientific community with data and information necessary to evaluate the variability of the global

environment, distinguishes between natural and anthropogenically-induced change, and strengthens predictive capability. Information Management follows an "end-to-end" data management philosophy. The principal goal is to provide high-quality data and information to all scientists and thereby facilitate their work, which includes predictive research, development, and applications.

Information Management foci include (1) Data Archaeology, which concentrates on the rescue, digitization, and assembly of high-priority data sets and metadata of sufficient quality to meet the stringent requirements of global change research; (2) Data Access and Archive Management, which provides the means to make these data sets accessible to scientists; and (3) Pathfinder, which is utilizing community-consensus algorithms developed through government/academic cooperative efforts for the re-processing and distribution of large-volume, multidecadal, global-scale, operational satellite data sets.

U.S. Weather Research Program

The USWRP has established the importance of "providing data access" within one of its Integrating Priorities. The USWRP strategic plan states that providing data access is "of critical importance to the success and impact of the modernization of the national weather observing network is the availability of data to the scientific community and the private sector." The USWRP strategy provides resources for research-quality collection, processing, storage, catalog, retrieval, and dissemination of mesoscale weather data. These data access activities will be coordinated with corresponding efforts that support climate and global change research.

USWRP's data management activities have resulted in the development of an integrated national meteorological database that includes a national atmospheric data catalog, on-line inventories, physical directories, station history information systems, automatic ingest systems, on-line order-entry systems, and on-line access to selected data.

Seasonal to Interannual Climate Forecasts

As part of NOAA's Strategic Plan for Seasonal to Interannual Forecasts, NOAA plans to implement the observing systems, technology development programs, and data systems required for the prediction, assessment, underlying research efforts

and future improvements necessary to attain quality forecasts. These efforts include:

- Global Ocean Observing System (GOOS) climate module: the Tropical Ocean-Global Atmosphere (TOGA) observing system, long-term ocean time series, surface and upper ocean temperature and altimeter satellite follow-ons, and data system upgrades.

- GOOS living marine resources module: buoy sensors, ocean color, plankton recorders.

- Global Climate Observing System (GCOS) atmospheric module: satellite data.

- Improved Data Systems: modernization of existing facilities to support GCDIS, and increased ocean data telemetry by low Earth orbit satellite communication.

Decadal-to-Centennial Environmental Change
In addition to the contributions to Global Change Research, NOAA has a number of specific data quality and continuity actions that are required to ensure an adequate long term climate record, which are part of NOAA Strategic Plan elements Decadal-to-Centennial Change:

- Establish a climate reference network from the existing set of the longest, most complete, and highest quality long-term cooperative weather stations.

- Improve the continuity and quality of information about observing procedures and instruments used to measure climate quantities (metadata) critical to understanding the sensitivity to natural and anthropogenic climate forcing.

- Routinely assess the homogeneity of observing systems data to guard against undetected spurious trends in the data.

Global Change Joint Venture Projects
In these times of shrinking budgets and increased responsibilities, it is imperative that Federal agencies develop strategic alliances and partnerships so that data and information may be more efficiently

developed and disseminated to the public. The Bureau of the Census and the National Climatic Data Center recently embarked on several joint venture projects related to global change. Demographic and climatic data sets will be merged and made available to researchers via the Internet.

The Bureau of the Census is currently working with the Consortium for International Earth Sciences Information Network (CIESIN) to allow users of CIESIN's on-line ordering and delivery system to order Census products directly. The Center for International Research of the Bureau of the Census provides world population grid cell data, the HIV/AIDS Surveillance Database, and the International Database to the CIESIN.

User Advisory Process

The DOC data management activities predate the Global Change Program. They have established many different constituencies as part of their national mission. DOC welcomes the additional interest of the global change research community and plans to support its requests through leveraging the resources of the existing Department programs, activities, and advances brought about by other Federal initiatives such as the Office of Management and Budget (OMB) Circular A-130, National Information Infrastructure, Federal Geographic Data Committee, and the Executive Order 12862 Setting Customer Service Standards. DOC's various working groups will attempt to integrate the global change researcher's requirements and advice with the numerous existing advisory groups and panels, which share similar interests and concerns.

The CENR has directed that review and oversight of the data and information component of the USGCRP be provided by the National Research Council's Committee on Geophysical and Environmental Data (CGED) in cooperation with the National Academy of Science Board on Global Change. The National Data Centers and World Data Centers have scientific advisory panels, such as the CGED, in place for some time; and each Center has a technical review group made up of scientists from other Federal agencies, the university community, and for the National Climatic Data Center (NCDC) state climatologists. Many members of the global change research community already participate in the guidance activities. Other DOC information service providers such as the NTIS on-line scientific, technical, business information system, FedWorld, are driven by economic constraints and are responsive to the most rigorous advisory pressure through the market place.

The Bureau of the Census has long utilized advisory panels to provide guidance in its data creation and dissemination process and will continue to do so to support the global change research community's data and information needs. The communications Planning and Coordination Staff facilitates and coordinates Internet policy and suggests recommendations in the use of the Internet.

NOAA recently asked the University Corporation for Atmospheric Research to convene a distinguished panel of experts from various segments of the Earth science community to review its plans to modernize NOAA's Data and Information System. The panel met several times with representatives of NOAA's line offices and data management team to investigate all aspects of the proposed modernization. It produced a report in March 1994 entitled *Responding to Exponentially Increasing Demand*. NOAA is currently responding to the suggestions in this report.

Schedule

DOC is responding to the technology push and the user pull to get more and more of its diverse data sets available on line. The advances in client/server data management solutions and the availability of high-speed Internet connections are being used by the Department to better serve its users. Improved methods to access Internet information such as World Wide Web, Mosaic and gopher servers have sprung up across DOC, and growth in both on-line servers and users requests has been exponential over the past year.

However, these changes have not occurred without pain. The commercialization of Internet is placing new pressure on already strained budgets. The rapid growth in network-accessible information creates new demands for efficient exploratory tools such as a comprehensive catalog system containing directories, inventories, and metadata. The greater number of people from diverse backgrounds now accessing the data requires better documentation of the data sets, places additional stress on help facilities, and increases the need for higher quality data. These issues are being addressed as current budgets and budget projections allow.

The key functional areas for accessing the DOC holdings are connectivity (the ability for the users to connect to the Information Service Node), search (the ability to assess data directories, inventories, and guides) and browse (the ability of users to examine

samples or summaries of the data), and order and delivery (the ability for users to request and receive data). Four access levels for each of these functional areas have been defined for consistency across all of the Agency Implementation Plans. A summary of these definitions is provided in Appendix B. Each DOC Global Change Information Service Node used these definitions in completing its individual schedules of progress for the 3-years covered by this plan. The overall DOC progress for these functional areas is as follows:

Connectivity

75% of DOC's Information Service Nodes are currently connected to the Internet. Most of the current DOC Internet connections will be at least at T-1 speeds (1.544 Megabits/sec) by 1996. Approximately 30% are already at this level and are expected to reach T-3 (45 Megabits/sec) or higher speeds by that time. However, voice and fax requests by less sophisticated users will continue to be serviced as they are today. Technology improvements will be used to assist the human servicing these requests.

Search and Browse

NOAA's Environmental Data Directory already contains over 4,500 entries for DOC environmental data and information. A redesign of the directory structure is under consideration that will broaden the base to include non-traditional global change data such as economic, trade, and demographic data and will create greater flexibility. By 1996, 75% of DOC's data sets will be included in the new catalog system and limited browse capability will be available.

Order and Delivery

Most Global Change Information Service Nodes will support on-line ordering by 1996. On-line delivery presents greater challenges that must be addressed successfully if DOC is going to be able to handle the rush of orders at reasonable costs. Without the proper application of new technology, order and delivery of data can be highly people intensive and therefore, extremely costly. Massive amounts of data currently either archived off-line or in analog form must be shifted to digital mass storage and powerful data base management tools must be brought in to deal with them. By 1996, the most highly requested data sets will be on line and DOC will be experimenting with innovative approaches to increasing the on-line volume.

Budget   DOC is engaged in environmental data management activities as part of a balanced program of observations, analytical studies, climate prediction, and information management that support NOAA's C&GCP, USWRP, and NOAA's Strategic Plan. The information Management element of C&GCP is approximately $4.4 million annually for data archaeology, archive management, Pathfinder Data Sets, and C&GCP access. Of that total, approximately $400 thousand is focused on GCDIS access-related efforts. In addition, NOAA's Environmental Information Services (EIS) provides funding to NOAA Line Offices and Program Offices for data and information access. This funding is included in the budget table as NOAA GCDIS contributing efforts. NESDIS, NOS, NMFS, NWS, OAR and Costal Ocean Program are involved in these access projects, many of whom are listed in Section IV. Many other DOC activities make relevant data and information available to GC research and other users as part of their base program.

NOAA GCDIS Budget ($K)				
	93	94	95	96
Focused	400	400	400	400
Contributing	3182	5329	4422	4400
Total	3582	5729	4822	4800

The Bureau of the Census plans to service GCDIS requests through its new Internet connection. However, it has not received any new appropriation for the creation, expansion, and maintenance of its access node. Additional data management activities necessary to shift its global-change-relevant data assets will currently have to be funded out of existing resources.

NTIS FedWorld is operated as a cost recovery activity and does not receive funding to support its GCDIS involvement. It can only make data available to the global change researcher if the source of the data transforms the specific data into the required formats and structures, and furnishes the cost of placing it on FedWorld.

Section IV

System Overview

DOC has 30 Global Change Information Service Nodes providing access to traditional and nontraditional GC data and information. NOAA's three National Data Centers and seven World Data Centers provide environmental data on the Earth's atmosphere, oceans, and geology. Centers of Data throughout NOAA address specific needs for environmental data and expertise in air chemistry, field programs, etc., while the Bureau of The Census and NTIS's FedWorld provide access to a wealth of trade, economic, and demographic data and expertise from regional, state and centralized databases.

In addition to the global change researchers, these service providers assist hundreds of thousands of users each year in finding the data they need. Each service provider is eager to expand its user base and to make its resources more useful in climate studies as budgets permit. The service providers have completed single page information surveys for each GC Information Service Node to assist potential climate researchers to better understand how the individual nodes may assist their research. They have described the mission and purpose of the nodes at a high level; and they have provided e-mail addresses and contact points for each Information Service Node. Additional information is also provided on the general data and information holdings, how to access the holdings, what interfaces are available, which standards are in use, and the availability of user assistance. A schedule is included for each node showing progress toward achieving the full GCDIS Access. Refer to Appendix B for a definition of the access levels by functions.

DOC GCISN Titles

NOAA/NESDIS/National Climatic Data Center
NOAA/NESDIS/National Geophysical Data Center
NOAA/NESDIS/National Oceanographic Data Center

NOAA/NESDIS/World Data Center-A for Glaciology
NOAA/NESDIS/World Data Center-A for Meteorology
NOAA/NESDIS/World Data Center-A for Marine Geology and Geophysics
NOAA/NESDIS/World Data Center-A for Oceanography
NOAA/NESDIS/World Data Center-A for Paleoclimate
NOAA/NESDIS/World Data Center-A for Solar-Terrestrial Physics
NOAA/NESDIS/World Data Center-A for Solid Earth Geophysics

NOAA/NMFS/Fisheries Science Centers -Northeast
NOAA/NMFS/Fisheries Science Centers -Northwest

NOAA/OAR/Pacific Marine Environmental Laboratory
NOAA/OAR/Climate Monitoring and Diagnostics Laboratory
NOAA/OAR/Climate Diagnostic Center

NOAA/NWS/Climate Analysis Center, Diagnostics Branch
NOAA/NWS/Office of Hydrology

NOAA/NESDIS/Environmental Information Services
NOAA/NESDIS/Satellite Active Archive Center
NOAA/NESDIS/National Snow and Ice Data Center
NOAA/NESDIS/NOAA Central Library and Information Services Division

National Technical Information Service
UCAR/NOAA Office of Field Project -Support Data Management Center

Bureau of The Census/Center for International Research
Bureau of The Census/Regional Offices
Bureau of The Census/Census Data User Services Division
Bureau of The Census/Public Information Office
Bureau of The Census/Data-Information Centers

DOC GCDIS Information Service Nodes

The GCDIS Information Service Nodes are shown on the following pages as they appear in the above list. E-mail addresses and contact points for each Node are included. The surveys also show information on general data and information holdings, how to access them, what interfaces are available, which standards are in use, and the availability of user assistance. The included

schedule for each Node is shown in table form. Refer to Appendix B for a definition of the access levels by functions within these schedules.

Global Change Information Service Node

Organization NOAA/NESDIS/National Climatic Data Center　　　　　　**September 7, 1994**

Data System NCDC Research Customer Services Group

Description/Purpose NCDC has meteorologists and climatologists available to answer questions and requests from researchers. These individuals act as the interface between researchers requesting data and the NCDC customer service representatives and the NCDC Global Climate Laboratory researchers.

Content Surface Land Parameters: Clouds, visibility, wind, temperature, humidity, pressure, precipitation, weather. Upper Air Parameters: pressure, height, wind, humidity, and special phenomena. Wind profiler data. Climatological Products: Environmental indicators, publications, interactive graphics Remotely Sensed Data: Data, data browse, and inventories. Other Datasets.

Access Phone:　　Research Customer Search Group - 704-271-4994/4995
　　　　　Email:　　orders@ncdc.noaa.gov
　　　　　Facsimile: 704-271-4876
　　　　　Mail:　　Research Customer Service Group
　　　　　　　　　National Climatic Data Center
　　　　　　　　　151 Patton Avenue
　　　　　　　　　Asheville, NC 28801

Interfaces US telephone system, Internet access, US postal service

Standards Internet protocol

User Assistance NCDC Research Customer Service Representatives:
　　　　　phone:　　704-271-4994/4995,
　　　　　E-mail:　　tross@ncdc.noaa.gov or nlott@ncdc.noaa.gov
　　　　　fax:　　704-271-4876

　　　　　Satellite Data Services:
　　　　　phone:　　301-457-5454
　　　　　E-mail:　　sdsdreq@ncdc.noaa.gov
　　　　　fax:　　301-457-5457

Schedule

Function	FY 1995	FY 1995	FY 1996
Connectivity	4	4	4
Search	4	4	4
Browse	4	4	4
Order	4	4	4
Delivery	4	4	4

Global Change Information Service Node

Organization NOAA/NESDIS/National Climatic Data Center September 7, 1994

Data System NCDC Mosaic Home Page

Description/Purpose Provides one stop on-line access to the NCDC On-line Access and Service information System (OASIS), NCDC On-line Satellite Catalog Access and Retrieval (OSCAR), Satellite Active Archive, NCDC Bulletin Board System/Hot line, NCDC On-line Climate Research Products and DATA (GCPS), and Anonymous File Transfer Protocol (FTP).

Content On-line access to surface land parameters, upper air parameters, wind profiler data, climatological products: environmental indicators, publications, interactive graphics visualization, remotely sensed data and inventories and other selected data sets.

Access On-line: NCDC Home Page: UNIX Workstation, PC with x-windows World Wide Web - http://www.ncdc.noaa.gov/ NCDC Home Page provides access to NCDC On-line Access and Service Information System (OASIS), NCDC On-line Satellite Catalog Access and Retrieval (OSCAR), Satellite Active Archive, NCDC Bulletin Board System/Hot line, NCDC On-line Climate Research Products and Data (GCPS), and Anonymous File Transfer Protocol (FTP).

Interfaces World Wide Web - see access above. GCMD and NOAADIR - automatic linking and context passing. Master World Wide Directory - numerous national/international sublinks

Standards NCDC Home Page - WWW, GIF, post script

User Assistance NCDC Research Customer Service Representatives:

    phone: 704-271-4994/4995,

    E-mail: tross@ncdc.noaa.gov or nlott@ncdc.noaa.gov

    fax: 704-271-4876

    Satellite Data Services:

    phone: 301-457-5454

    E-mail: sdsdreq@ncdc.noaa.gov

    fax: 301-457-5457

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	1	1
Browse	1	1	1
Order	2	2	1
Delivery	1	1	1

Global Change Information Service Node

Organization NOAA/NESDIS/National Climatic Data Center   **September 7, 1994**

Data System NCDC On-line Access and Service Information System (OASIS)

Description/Purpose Provides Internet on-line access to NOAA's Environmental Data via workstation or personal computer. This system services researchers and other NCDC customers with Internet access.

Content The data on-line are: surface; precipitation; upper air; wind profiler; modeled output; cooperative summary of the day; climate division temperature, precipitation and drought; GCM modeled output, field experiment, and NEXRAD level II inventories. Other datasets added as requested.

Access On-line: NCDC On-line Access and Service Information System (OASIS): Unix Workstation or PC World Wide Web - Via NCDC Home Page or http://www.ncdc.noaa.gov/oasis/oasis.html Internet (using telnet) - open hurricane or open 192.67.134.72

User ID:	storm
Password:	research
Modem (2400 baud)	704-254-3138

Interfaces Internet, UCAR's Cooperative On-line Distributive Interactive Catalog (CODIAC), Global Change Master and NOAA directories.

Standards NCDC Home Page - WWW, GIF, post script

User Assistance NCDC Research Customer Service Representatives:

phone:	704-271-4994/4995,
E-mail:	tross@ncdc.noaa.gov or nlott@ncdc.noaa.gov
fax:	704-271-4876

Satellite Data Services:

phone:	301-457-5454
E-mail:	sdsdreq@ncdc.noaa.gov
fax:	301-457-5457

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	1	1
Browse	1	1	1
Order	2	2	1
Delivery	1	1	1

Global Change Information Service Node

Organization NOAA/NESDIS/National Climatic Data Center   **September 7, 1994**

Data System NCDC On-line Satellite Catalog Access and Retrieval System (OSCAR)

Description/Purpose To permit users access to polar-orbiting satellite data and products.

Content Inventories from the Advanced Very High Resolution Radiometer (AVHRR) and TIROS Operational Vertical Sounder (TOVS) polar orbiting satellites. The data range is from April 1985 to the present, for 1 km resolution Global Area Coverage (GAC) has an inventory from October 1978 to the present.

Access On-line: NCDC On-line Satellite Catalog and Access Retrieval System (OSCAR): Unix Workstation or PC World Wide Web - Via NCDC Home Page or http://www.ncdc.noaa.gov/oasis/oasis.html Internet (using telnet) - open 140.90.110.5
Modem: 1-800-528-2514

Interfaces Internet, Global Change Master and NOAA directories.

Standards NCDC Home Page - WWW

User Assistance NCDC Research Customer Service Representatives:
phone: 704-271-4994/4995,
E-mail: tross@ncdc.noaa.gov or nlott@ncdc.noaa.gov
fax: 704-271-4876

Satellite Data Services:
phone: 301-457-5454
E-mail: sdsdreq@ncdc.noaa.gov
fax: 301-457-5457

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	1	1
Browse	1	1	1
Order	2	2	1
Delivery	1	1	1

Global Change Information Service Node

Organization NOAA/NESDIS/National Geophysical Data Center (NGDC)   **August 15, 1994**

Data System Geophysical On-Line Data (GOLD)

Description/Purpose NGDC provides On-Line/Internet accessible data and information in the fields of solid Earth geophysics, marine geology and geophysics, paleoclimatology, solar-terrestrial physics, satellite meteorology and snow and ice. Users include academia, researchers, industry, all levels of U.S. Government, foreign governments, and the general public.

Content NGDC's data holdings currently consist of more than 300 digital and analog data bases (3+ terabytes) in the areas mentioned above. Directory information on these data bases can be obtained form the NOAADIR at: http://www.esdim.noaa.gov, and gopher.esdim.noaa.gov

Access Mail: NOAA/NGDC, E/GC, 325 Broadway
                             Boulder, CO. 80303

Tel:	303-497-6826
Fax:	303-497-6513
E-mail:	info@ngdc.noaa.gov
Anonymous FTP:	ftp.mgdc.noaa.gov
Gopher:	gopher.ngdc.noaa.gov
WWW:	http://www:gdc.noaa.gov:4096/sfgate/index.html
Distribution media:	CD-ROM, paper, film, 9-track magnetic tape, 8 mm tape, 3480 tape cartridge, diskette, & electronic transfer via the Internet.

Interfaces Anonymous FTP, Gopher, World Wide Web, Mosaic, Internet, Bulletin Board System, and automatic linking to the NOAA Directory.

Standards Because of the variety of disciplines, data are in numerous standards. Most data are available as ASCII or Binary files. Some data are available for use with DOS/Windows, Unix and Macintosh operating systems. Data for exchange can be provided in any required standard format using the Freeform translator or other translational tools.

User Assistance Internet:

on-line help:	info@ngdc.noaa.gov
off-line help:	303-497-6139

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	2
Browse	3	2	1
Order	3	2	1
Delivery	3	2	1

Global Change Information Service Node

Organization   NOAA/NESDIS/National Oceanographic Data Center (NODC)   **July 29, 1994**

Data System   National Oceanographic Data Center (NODC)

Description/Purpose The NODC mission is to acquire, process, quality control, archive and distribute all types of oceanographic data. US and international bilateral agreements provide hundreds of thousands of oceanographic observations annually. Users include research scientists, commercial ventures, educators and the general public. Architecture is client-server with WORM mass storage.

Content Physical Oceanographic parameters, including temp, salinity, nutrients, oxygen, trace elements, and radiomucleides are uniformly quality controlled. Ocean current and buoy data are uniformly QC and described on NOAADIR at: http://www.noaa.gov. Biological data is held in non-standard formats with non-standard quality control and is described in Users Services Manual (telnet to gopher.nodc.noaa.gov) or e-mail to services @nodc.noaa gov.

Access WWW: http://www:nodc.noaa.gov

        Gopher: gopher.nodc.noaa.gov

        E-mail: services@nodc.noaa.gov

        Anonymous ftp, magnetic tape, CD-ROM, fax and hardcopy are also available

Interfaces World Wide Web, Gopher, NOAADIR and Coastwatch nodes are in residence and NODC will be an EOSDIS Affiliated Data Center.

Standards Data held in ASCII, GIF and binary bit stream formats.

User Assistance E-mail :   services@nodc.noaa.gov

        Data submission and servicing guides are on-line Gopher:

        Gopher: nodc.noaa.gov

        Active international training program

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	2	2	2
Search	4	3	3
Browse	2	1	1
Order	2	1	1
Delivery	2	2	2

Global Change Information Service Node

Organization NOAA/NESDIS/World Data Center-A for Glaciology   **July 29, 1994**

Data System World Data Center A for Glaciology (Snow and Ice)

Description/Purpose WDC-A for Glaciology (Snow and Ice) facilitates the international exchange of data on all forms of snow and ice, including avalanches, paleoglaciology, freshwater ice, polar ice sheets, glacier fluctuations, sea ice, glacier mass balance, seasonal snow cover, ground ice (permafrost), extraterrestrial ice. Data and library services are provided. Operated for NOAA/NESDIS/NGDC, co-located with the National Snow and Ice Data Center.

Content WDC-A Glaciology's holdings are described in NOAADIR at http://www.esdim.noaa.gov and gopher.esdim.noaa.gov, and/or in Global Change Master Directory.

NOAA/NESDIS/NGDC, co-located with the National Snow and Ice

Access Mail: WDC/NSIDC

                           University of Colorado

                           Boulder, CO 80309-0449

Tel: 303- 492-6199

Fax: 303- 492-2468

Email: nsidc@kryos.colorado.edu

Omnet: NSIDC

Gopher: gopher.ngdc.noaa.gov

WWW: http://nsidc.colorado.edu/NSIDC/wdc-a.html

Distribution media: CD-ROM, 8mm tape, 9-track magnetic tape, 3480 cartridge, diskette, electronic transfer (data staged on request) via the Internet, photographic and paper copies.

Interfaces Gopher, World Wide Web, Mosaic, Internet, anonymous ftp by request.

Standards Most data are available as ASCII or binary files. Most data are compatible with DOS/Windows, Unix, and VMS operating systems, some are compatible with Macintosh. Some data are in HDF (Hierarchical Data Format).

User Assistance User Services order and help desk 8-5 M-F Mountain Time. Some online documentation on gopher.ngdc.noaa.gov (Snow_and_Ice).

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	3	2	1
Browse	4	2	2
Order	3	3	3
Delivery	2	2	2

Global Change Information Service Node

Organization NOAA/NESDIS/World Data Center-A for Meteorology   **July 29, 1994**

Data System NCDC Climate Services System

Description/Purpose The WDC-A for Meteorology is a repository for atmospheric data exchanged internationally, data bases from international experiments and research programs with a specific mission to service the research community. Copies of the data and accompanying documentation are provided to researchers upon request. The activities of the WDC-A are performed by NCDC.

Content Foreign Meteorological data publications, meteorological data collected during specific international programs including, but not limited to International Geophysical Year (IGY), Global Atmospheric Research Program experiments (GATE, FGGE, MONEX, SMONEX, WMONEX, etc.), World Climate Research Program (TOGA, GPCP, etc.). Quality control performed and documentation prepared by designated experiment centers before submission to WDC-A.

Access Phone: Research Customer Search Group - 704-271-4994/4995 Facsimile: 704-271-4876, Mail: World Data Center-A for Meteorology, Email: orders@ncdc.noaa.gov, Research Customer Service Group, National Climatic Data Center, 151 Patton Avenue, Asheville, NC 28801-5001, On-line, UNIX Workstation, PC with x-windows, NCDC Home Page: World Wide Web - http://www.ncdc.noaa. gov/, NCDC On-line Access and Service Information System (OASIS): World Wide Web - Via NCDC Home Page or http://www.ncdc.noaa.gov/oasis/oasis.html, Internet (using telnet) - open hurricane or 192.67.134.72; User ID: storm, Password: research, Modem (2400 baud) - 704-254-3138, NCDC On-line Satellite Catalog Access and Retrieval (OSCAR): World Wide Web - Via NCDC Home Page or http://www.ncdc.noaa.gov/wdca.html (info only) , Internet (using telnet) - open 140.90.110.5 - Modem: 1-800-528-2514

Interfaces World Wide Web;.GCMD and NOAADIR - automatic linking and context passing. Master WorldWide Directory with numerous national/international sublinks.

Standards NCDC Home Page - Mosaic, GIF, post script; Bulletin Board: via modem, OASIS - NCDC Home Page, Mosaic, or Telnet. Data in EBUFR/ASCII with format translators. OSCAR - NCDC Home Page, ESDIM Home Page, Mosaic or Telnet.Data in ASCII..

User Assistance WDC-A/NCDC Research Customer Service Representative: 704-271-4994/4995, e-mail: tross@ncdc.noaa.gov or nlott@ncdc.noaa.gov, fax: 704-271-4876.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	3/4	1	1
Search	3	3	2
Browse	4	4	4
Order	4	1	1
Delivery	4	3	3

Global Change Information Service Node

Organization	NOAA/NESDIS/World Data Center-A for Marine Geology and Geophysics	September 7, 1994

Data System WDC-A for Marine Geology and Geophysics (MGG) Online Information
Description/Purpose The WDC-A for Marine Geology and Geophysics provides online access to global bathymetry/relief data, underway measurements of gravity, magnetics, and seismic reflection, and analyses derived from ocean drilling and marine sediment and rock samples. The WDC-A for MGG online system offers Internet access via anonymous ftp, gopher, and Mosaic.

Content Data are available in a variety of formats, digital and analog. Underway geophysical data are in the MGD77 format. Geological data are in a variety of formats according to analysis type. Online inventory searches provide detailed information on available data meeting users search criteria. Metadata including data announcements and format descriptions are available online, and all data sets are described in DIF format.

Access Online inventory searches use a cross-platform Mosaic forms interface requiring either PC-Windows, Macintosh, or Mosaic. URL is http://www.ngdc.noaa.gov/mgg/geolsys.html. Distribution media for actual data include forms from hard copy, microfiche/microfilm, CD-ROM, magnetic tape, exabyte, floppy diskette, ftp download, and other forms on request.

Interfaces Inventory searches are via WWW. Information and metadata are also available via gopher (gopher.ngdc.noaa.gov) and anonymous ftp (ftp.ngdc.noaa.gov). DIFS of data sets are included in NOAADIR, GCMD, NEDRES, and ESDD. Major data sets are fully described via Mosaic pages beginning at URL http://www.ngdc.noaa. gov/mgg/mggd.html including complete text of data announcements. Linkages to WOCE, GEBCO, IHODCDB, etc. are described via Mosaic.

Standards Most digital data are available for distribution in ASCII text format, as are all metadata. Accompanying images online are in GIF or JPEG/MPEG format. Inventory access via Mosaic forms. CD-ROM software is cross-platform and includes C/C++ code and FORTRAN.

User Assistance Online help is available for inventory searches, CD-ROM products also include search manuals/software. Direct e-mail buttons are included on all Mosaic pages, and contact information is given with all ftp/gopher files. General online assistance is cjm@ngdc.noaa.gov, 303-497-6339, fax 303-497-6513.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	2	1	1
Order	2	1	1
Delivery	2	1	1

Global Change InformationService Node

Organization NOAA/NESDIS/World Data Center-A for Oceanography   July 29, 1994

Data System World Data Center-A Oceanography (WDC-A)

Description/Purpose Operated by NODC as a component of an international network of scientific sub-discipline centers, the WDC-A acquires, catalogs, and archives oceanographic data and publications. It also exchanges data routinely with other WDC Oceanography Centers. It uses the NODC systems for data servicing and maintains separate manual systems for acquisition, tracking and archiving.

Content WDC-A holdings are primarily physical and chemical oceanographic observations.

Access Data received is normally held as hard copy or magnetic tape. When this data is passed to the NODC systems for processing, quality control and archiving it is reconfigured (refer to NODC entry). WDC-A publishes a catalog holdings biennially.

Interfaces None.

Standards All data received on magnetic tape is held in ASCII format in both the originator's and in NODC standard formats. Hard copy data is digitized into NODC standards as funds are available. Publications are held as hard copy only.

User Assistance E-mail is NODC.WDCA on OMNET or telephone/fax. An active training program is carried out for international partners.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	3	3	3
Search	4	4	4
Browse	4	3	3
Order	3	3	2
Delivery	3	3	2

Global Change Information Service Node

Organization World Data Center-A for Paleoclimatology   **August 11, 1994**

Data System Various Data Systems

Description/Purpose Data archive and dissemination activities in the field of paleoclimatology, including data from lake and marine sediments tree rings, pollen, ice cores, and corals, as well as climate model output. Raw data, derived indices, and climatic reconstructions are all included in the archive with documentation. Users include academia, research, industry, government both U.S. and foreign, and the general public.

Content WDC-A for Paleoclimatology data holdings currently contain more than 300 megabytes of paleoclimate proxy data from the above discipline areas, encompassing thousands of sites worldwide. Detailed information on these data bases can be obtained from the NOAADIR at: http://www.esdim.noaa.gov and gopher.esdim.noaa.gov, or directly from WDC-A at: http://www.ngdc.noaa.gov/paleo.html or gopher.ngdc.noaa.gov.

Access Access via:

Mail	WDC-A for Paleoclimatology NOAA/NGDC Mail Code E/GCx3
	325 Broadway
	Boulder, CO 80303
Telephone:	303-497-6280
Fax:	303-497-6513
E-mail (Internet):	paleo@ngdc.noaa.gov.
WWW:	http://www.ngdc.noaa.gov/paleo.html.
Distribution Media:	Hard copy, floppy diskette, and transfer via FTP.

Interfaces FTP, Gopher, World Wide Web, Mosaic, Internet, and automatic linking to NOAADIR.

Standards Because of the variety of disciplines, data are in numerous standards. All data are available as ASCII files in the standard format for the discipline. NetCDF format files are being generated for all data in the WDC-A for paleo archive. The data are available for use with DOS, UNIX, and Macintosh operating systems.

User Assistance Users are encouraged to contact Bruce Bauer at 303-497-6280 or e-mail bab@ngdc.noaa.gov for assistance.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	2
Browse	2	2	1
Order	2	2	2
Delivery	1	1	1

Global Change Information Service Node

Organization NOAA/NESDIS/World Data Center-A for Solar-Terrestrial Physics   **September 20, 1994**

Data System Geophysical On-Line Data (Gold)

Description/Purpose The WDC-A for Solar-Terrestrial Physics provides on-line access to data that describe solar activity and its influence on Earth systems (cosmic ray effects, the ionosphere response and geomagnetic variations). Satellite data include the GOES X-ray, particle and magnetometer data; the polar-orbiter NOAA/TIROS precipitating particle data; and the DMSP meteorological, oceanographic and space environmental components.

Content Data are in a number of formats, digital and analog. Many datasets appear in the monthly report Solar-Geophysical Data that includes a descriptive text. Data are quality controlled using existing software. On-line data are updated monthly. All datasets are described in DIF format.

Access Access via:

Mail:	World Data Center-A STP, NOAA E/GC2
	325 Broadway, Boulder, CO USA 80303
Telephone:	(303) 497-6324
Fax:	(303) 497-6513
E-mail:	chanchett@ngdc.noaa.gov
Anonymous ftp:	ftp.ngdc.noaa.gov or 192.149.148.109 (login anonymous, password e-mail address)
Gopher:	gopher.ngdc.noaa.gov
WWW:	http://www.ngdc.noaa.gov
Bulletin Board:	modem (303) 497-7319
Distribution Media:	Hard copy, floppy diskette, and transfer via FTP.

Interfaces Anonymous FTP, Gopher, World Wide Web, Mosaic, Internet, Bulletin Board System, and automatic linking to the NOAA Directory (http://www.esdim.noaa.gov).

Standards Most data are available as ASCII or binary files. Image files are in FITS, GIF, MPEG/JPEG, etc, formats. Some data are available for use with DOS/Windows, Unix, and Macintosh operating systems. Access software include Mosaic, Xchange (Bulletin Board), FORTRAN, and IDL systems.

User Assistance On-line assistance is available through e-mail directly from Mosaic. Other assistance is available via telephone 303-497-6132 and info@ngdc.noaa.gov.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	1
Browse	2	2	1
Order	2	2	1
Delivery	2	2	1

Global Change Information Service Node

Organization NOAA/NESDIS/World Data Center-A for Solid Earth Geophysics **August 30, 1994**

Data System Geophysical On-Line Data (Gold)

Description/Purpose The WDC-A for Solid Earth Geophysics, through the National Geophysical Data Center, provides on-line access to global ecosystems, magnetic measurements, digital terrain models, gravity, seismology, heat flow, and environmental hazards data and information. the data are used by scientists, engineers, and educators worldwide. The WDC-A receives data from foreign and domestic sources.

Content The WDC-A for SEG provides on-line access to data documentation in all the above areas. In addition, data and software are available on-line in the areas of magnetism, ecosystems, vegetation indices, heat flow, seismology, and environmental hazards. Data are continuously being prepared to expand on-line access. Directory information can be obtained from the NOAADIR at: http://www.esdim.noaa.gov and gopher.esdim.noaa.gov.

Access Mail: World Data Center-A for SEG, E/GC1
325 Broadway, Boulder, CO USA 80303

Telephone: (303) 497-6521

Fax: (303) 497-6513

E-mail: hmeyers@ngdc.noaa.gov

Anonymous ftp: ftp.ngdc.noaa.gov (login anonymous, password e-mail address)

Gopher: gopher.ngdc.noaa.gov

WWB: http://www.ngdc.noaa.gov/wdcmain.html

Distribution Media: CD-ROM, diskette, 9-track tape, 3480 tape, 8mm tape, electronic transfer

Interfaces Anonymous FTP, Gopher, World Wide Web, Mosaic, Internet, Bulletin Board System, and automatic linking to the NOAA Directory .

Standards Because of the variety of disciplines, data are in numerous standards. Most data are available as ASCII or Binary files. Some data are available for use with DOS/Windows, Unix and Macintosh operating systems. Data for exchange can be provided in many required standard formats using the Free Form translator or other translator tools. Access software include GeoVu, Mosaic, Xchange, and others.

User Assistance On-line assistance is available through e-mail directly from Mosaic. Other assistance is available via telephone 303-497-6478 and info@ngdc.noaa.gov.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	2
Browse	2	2	1
Order	3	2	1
Delivery	2	2	1

Global Change Information Service Node

Organization NOAA/NMFS/Fisheries Science Center-Northeast   **July 29, 1994**

Data System Northeast Region Fisheries Information Systems

Description/Purpose To support fisheries management and research. Data systems reside on SUN and SGI workstations (UNIX), microcomputers (DOS) accessible through ORACLE or PC database management tools.

Content Distribution and abundance of living marine resources, semi-annually, biannually depending upon species; hydrographic data for Northeast continental shelf region; high level of quality control; no online tools for analysis or display.

Access Systems are accessible through direct dial and INTERNET.
Access support for Telnet and FTP for authorized individuals only.
Anonymous FTP accounts are available on a limited basis.
WWW: http://gopher.wh.whoi.edu/noaa.html

Interfaces World Wide Web, Gopher links and general Internet access.

Standards Data files may be standardized to ASCII or DBF form.
Support provided for MOSAIC and Telnet.
Operating systems are UNIX (SUN OS and IRIX).

User Assistance Data Management Support: 508-548-5123.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	3	2	1
Search	4	3	2
Browse	4	3	2
Order	4	3	2
Delivery	4	4	3

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Global Change Information Service Node

Organization NOAA/NMFS/Fisheries Science Center-Northwest   **July 29, 1994**

Data System NWFSC Mosaic Server

Description/Purpose Provide information on the Northwest Fisheries Center's mission, organizational structure, and research activities to Internet users.

Content Current content includes capsule descriptions of the center's mission and research programs, protocols from the molecular biology laboratory, and information on the joint Northwest and Alaskan fisheries library, which contains data on threatened or endangered species and generic strains of salmon and trout including fall Chinook, spring/.summer Chinook, sockeye, West Coast coho, West Coast steelhead, etc.

Access WWW: http://listeria.nwfsc.noaa.gov/nwfsc-homepage.html

Interfaces World Wide Web.

Standards Mosaic html, GIF.

User Assistance On-line instruction.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	4	4	4
Browse	2	2	2
Order	3	3	3
Delivery	4	4	4

Global Change Information Service Node

Organization NOAA/OAR/Pacific Marine Environmental Laboratory   **July 29, 1994**

Data System EPIC System and TOGA-TAO Software

Description/Purpose PMEL conducts research in physical oceanography, marine meteorology, geochemistry, and related subjects. EPIC is a system for archive, retrieval, display, and analysis of oceanographic time series and hydrographic data, in support of research being conducted by PMEL scientists. The TAO Display Software distributes real-time TOGA-TAO buoy data to remote users with point-and-click access to data displays.

Content EPIC includes CTD, Bottle, XBT, time series from moored buoys, shipboard surface measurements, shipboard ADCP. These are final, quality-controlled data which has typically been submitted to NODC. EPIC data files are self documenting, and EPIC includes a suite of approximately 100 display and analysis programs. The TAO software distributes real-time data with final quality control.

Access EPIC data and software is supported for VAX and for Unix. ASCII listings and graphics (X-Windows or teletronix) are available with utility programs. EPIC software is available via anonymous ftp (host ID csg.pmel.noaa.gov), directory (anonymous.epic). The TAO software and data are on the same host in (anonymous.tao).

Interfaces Neither EPIC nor the TAO software are available for remote log in at this time. Graphical display of a limited subset of TOGA-TAO data is available through Mosaic.

Standards EPIC is supported for VAX and Unix, with the Unidata NetCDF format. The TAO software is supported for Unix, and utilizes EPIC data formats.

User Assistance The EPIC and TAO software include extensive on-line help, e-mail support available from epic@pmel.noaa.gov and taogroup@pmel.noaa.gov.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	2	2	2
Search	1	1	1
Browse	1	1	1
Order	3	3	3
Delivery	2	2	2

Global Change Information Service Node

Organization NOAA/OAR Climate Monitoring and Diagnostics Laboratory　　　　　　**July 29, 1994**

Data System N/A

Description/Purpose The laboratory conducts research to measure atmospheric composition, to assess climate fluctuations and to develop climate prediction techniques on a wide range of time scales. CMDL operates a network of global sites. The data records are used by scientists worldwide as authoritative of global chemical information.

Content Data from CMDL observatories and other special projects are available under the following research programs: aerosols, carbon dioxide and methane, meteorology, nitrous oxide and halocarbons, surface and total ozone, solar radiation.

Access via Internet by anonymous FTP to ftp.cmdl.noaa.gov, data also available by request on floppy disks, 3480 and exabyte tapes. ASCII and binary formats available.

Interfaces World Wide Web at http://www.cmdl.noaa.gov

Standards Data - ASCII, gif, access software - Mosaic, FTP).

User Assistance E-mail: ftpadmin@cmdl.noaa.gov, online help: readme files

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	2	2	2
Search	2	2	2
Browse	2	2	2
Order	2/3/4	2/3/4	2/3/4
Delivery	2/4	2/4	2/4

Global Change Information Service Node

Organization NOAA/OAR Climate Diagnostics Center   **July 29, 1994**

Description/Purpose The Climate Diagnostics Center (CDC) scientists conduct diagnostic studies of climate variability, including satellite data research. CDC also serves data management and scientific dataset development functions. The primary users of CDC data and software tools are its local researchers; climate researchers affiliated with NOAA and educational institutions are also supported.

Content 15 datasets, with online documentation including COADS, NMC Re analysis Data Products, and other climate data. Details are in the README file at cdcftp.dcd.noaa.gov (FTP) or at the World Wide Web URL ftp://cdcftp.cdc.noaa.gov/Datasets, and in the README files located in each dataset directory. Locally supported tools: Climate Research Data Tools (CRDtools). Other software actively used by CDC scientists includes GrADS, Freud, NCAR, Graphics, and Khoros.

Access ASCII text: FTP; WWW access using text-based browsers. ASCII with graphics, Xwindows: FTP; WWW using browsers with graphics capability (such as Mosaic for Xwindows or the Macintosh). CRDtools access to datasets requires a platform running Xwindows (or an Xwindows emulator). Mosaic: http://www.cdc.noaa.gov

Interfaces World Wide Web (WWW) links exist between CDC and other NOAA labs. WWW interfaces to data at Pacific Marine Environmental Laboratory (PMEL) and the Joint Institute for the Study of Atmosphere and Ocean (JISAO) are in progress.

Standards CDC data holdings are archived in netCDF format. CDC net CDF conventions have been specificized and are available at URL http://cdc.noaa.gov/cdc/cdc_netcdf_standards.html. Platforms: Sun, currently running Solaris 5.3 and Openwindows Version 3.3 Languages used: C, FORTRAN. WWW access is provided by the current NCSA release of Mosaic and httpd software.

User Assistance User assistance is available via e-mail at crdtools@cdc.noaa.gov (CRDtools support), webmaster@cdc.noaa.gov (CDC WWW support), and cdcdata@cdc.noaa.gov (CDC dataset support). All CRDtools and data access documentation is anticipated to be online by the end of FY 1995.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1/2	1/2	1/2
Search	2	1	1
Browse	1 (Local Users)	1 (All)	1
	2 (Remote Users)	1 (All)	1
Order	3	1/2	1
Delivery	3	1/2	1

Global Change Information Service Node

Organization NOAA/NWS/Climate Analysis Center, Diagnostics Branch   **August 30, 1994**

Data System Climate Diagnostics Data Base (abbreviated)

Description/Purpose Make available to the user community data fields that are useful for climate monitoring on time-scales of weeks to months.

Content Selected standard oceanographic and surface/upper-air meteorological fields from in situ observations and model assimilations.

Access ASCII text only via anonymous ftp:

ftp address:	nic.fb4.noaa.gov (140.90.50.22)
user ID:	anonymous
password:	your e-mail address
WWW:	http://demo1.eis.noaa.gov/nws/nws-cac.html (info only)

Interfaces No other interfaces currently.

Standards All data are ASCII. Must use "ftp" to access these data.

User Assistance On-line instructional files are provided.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	4	4	4
Browse	4	2	2
Order	3	2	2
Delivery	3	3	3

Global Change Information Service Node

Organization NOAA/NWS/Office of Hydrology   **July 29, 1994**

Data System NOAA Hydrologic Data System

Description/Purpose Satisfy NWS Hydrology program needs for high quality retrospective data. Capture and provide operational hydrologic data sets for GCIP. Planned UNIX workstations with data relational tables and flat files. This development will consolidate a number of hydrologic data sets that are currently located in the office of hydrology, various river forecasts centers and the NOAA computing center.

Content For United States: WSR-88D radar Stage I, II, and III gridded precipitation estimates; water balances from operational hydrologic models; NWS hydrology program operational data; retrospective estimates of areal precip, snowfall, snowcover, max/min temperature and associated meta data.

Access WWW: http://www.nohrsc.nws.gov:80/~hic   (Hydrologic Info. Center)

http://www.nohrsc.gov   (Office of Hydrology)

Interfaces Available through the internet.

Standards Hydrologic variable in "SHEF" and gridded fields in "GRIB"

User Assistance call Geoff Bonnin 301-713-1018

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	4	4	1
Search	4	4	1
Browse	4	4	1
Order	4	4	1
Delivery	4	4	1

Global Change Information Service Node

Organization NOAA/NESDIS/Environmental Information Services   **October 25, 1994**

Data System NOAA Data Directory Services

Description/Purpose NOAA Data Directory Services provide users with tools to locate data and information held in NOAA and other locations. Users can access the services using Internet and dial-in telecommunications. Several search tools allow access by users with basic computers using character interfaces, and by users with more sophisticated computers using world Wide Web clients. The NOAA Data Set Catalog provides distributed searching of a variety of databases.

Content The NOAA Environmental Services Data Directory describes over 5,000 data sets held in NOAA. The National Environmental Data Referral Service describes over 22,200 data sets held by organizations throughout the United States. The datasets are described and stored in DIF and NEDRES metadata formats.

Access Mail: NOAA Environmental Information Services
                             1825 Connecticut Ave., NW, Room 506, Washington, DC   20235

Voice: Phone 301-713-3578, Fax: 301-713-1249

E-mail: help@esdim.noaa.gov

Telnet: telnet gopher.esdim.noaa.gov (login "gopher"), telnet esdim.noaa.gov (login "lynx") telnet www.esdim.noaa.gov (login "lynx")

Dial-in: (202) 606-4666 at "xyplex" prompt, type "cesdim1" at "login:" prompt, type "gopher" or "lynx"

Gopher: gopher.esdim.noaa.gov

WWW: http://www.esdim.noaa.gov, http://www.esdim.noaa.gov/NOAA-Catalog.html

Interfaces WWW, Gopher, telnet, dial-up.

Standards The following metadata formats are used: Government Information Locator Service (GILS), Federal Geographic Data Committee (FGDC) metadata standard, Directory Interchange Format (DIF), National Environmental Data Referral Service (NEDRES) metadata format. The metadata are available as ASCII or HTML files through the WWW, Gopher, Telnet and Dial-up access.

User Assistance On line assistance is available through the WWW, Gopher, telnet and dial-up access points. Further help is available by calling 301-713-3578, sending e-mail to help@esdim.noaa.gov, or writing to the NOAA Environmental Information Services office.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	2
Browse	1	1	1
Order	3	2	1
Delivery	1	1	1

Global Change Information Service Node

Organization NOAA/NESDIS/Satellite Active Archive Center   **September 21, 1994**

Data System Satellite Active Archive (SAA)

Description/Purpose The SAA enables Internet users via telnet and WWW access to search browse, order, and receive data from NOAA and non-NOAA environmental satellites. SAA utilizes an RS6000 cluster, UNIX/AIX, C, Informix DBMS, and IBM's 3495 mass storage system.

Content Current (7/95) data holdings are:

AVHRR-LAC	Level 1b from NOAA 11, 12 and 14 platforms from 3/1/94 - present
AVHRR-GAC	Level 1b from NOAA 11, 12 and 14 platforms from 3/1/94 - present
AVHRR-HRPT	Level 1b from NOAA 11, 12 and 14 platforms from 3/1/94 - present
TOVS	Level 1b from NOAA 11, 12 and 14 platforms form 7/1/95 - present

There is a NOAA Polar Orbiter Data User's Guide document available. By 1997, NOAA intends to enhance the SAA with the inclusion of GOES-8, GOES-9, DMSP, RADARSAT, and ADEOS data sets.

Access Telnet to saa.noaa.gov or 140.90.232.101; Xwindows is necessary to utilize SAA's full functionality, however the character interface is still very useful. At the login screen the user is given option of logging in as a guest or registering. SAA will provide SLIP and PPP serial or modem access in near future.   SAA has its own home page on WWW (http://www.saa.noaa.gov) and is also completely interoperable with the EOSDIS VO IMS.

Standards SAA outputs only its browse images requested by EOSDIS VO IMS in HDF, at their request. SAA users receive browse in 1B format. SAA is accessible by Telnet and WWW (see above). Platform info is also given above. SAA will provide browse images in GIF in near future.

User Assistance SAA allows users to leave electronic comments just prior to exiting the system. There is no tangible user's guide but there is online system overview and help information. SAA Help: 301-763-8400, e-mail: saainfo@nesdis.noaa.gov

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	2	1	1
Order	1	1	1
Delivery	1*	1	1
Standard format: 1B, not option of NetCDF, BUFR, GRIB, etc.			

Global Change Information Service Node

Organization   NOAA/NESDIS/National Snow and Ice Data Center   **July 29, 1994**

Data System NSIDC

Description/Purpose NSIDC is operated for NOAA/NESDIS/NGDC as a national information and referral center in support of cryospheric and polar processes research. Areas covered include avalanches, paleoglaciology, freshwater ice, polar ice sheets, glacier fluctuations, sea ice, glacier mass balance, seasonal snow cover, ground ice (permafrost), extraterrestrial ice. Data and library services, and data management for several NSF, ONR and NASA projects are provided.

Content NSIDC's NOAA-related holdings are described in NOAADIR at http://www.esdim.noaa.gov and gopher.esdim.noaa.gov, and/or in the Global Change Master Directory.

Access Mail: NSIDC, University of Colorado

                         Boulder, CO 80309-0449

    Tel: 303-492-6199

    Fax: 303-492-2468

    Email: nsidc@kryos.colorado.edu

    Omnet: NSIDC

    Gopher: gopher.ngdc.noaa.gov.

    WWW: http://nsidc.colorado.edu

    Distribution media: CD-ROM, 8mm tape, 9-track magnetic tape, 3480 cartridge, diskette, electronic transfer (data staged on request) via the Internet.

Interfaces Gopher, World Wide Web, Mosaic, Internet

Standards Most data are available as ASCII or binary files. Most data are compatible with DOS/Windows, Unix, and VMS operating systems, some are compatible with Macintosh. Some data are in HDF (Hierarchical Data Format).

User Assistance User Services order and help desk 8-5 M-F Mountain Time.
                Some online documentation on gopher.ngdc.noaa.gov (Snow_and_Ice).

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	3	2	1
Browse	4	2	2
Order	3	3	3
Delivery	2	2	2

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Global Change Information Service Node

Organization NOAA/NESDIS/NOAA Central Library and Information Services Division   **July 29, 1994**

Data System NOAA Library and Information Network Catalog (NOAALINC)

Description/Purpose Maintains a collection of more than one million books, journals, technical reports, data in printed form, compact discs, and electronic databases that support research in the atmospheric sciences, meteorology, oceanography, and related disciplines. The electronic resources are on a PC, DOS, Windows, and CD-ROM platform. The staff provides reference services and assistance in the use of the collection. Content: These items are described in NOAALINC. Over 2000 items from this collection are described in the NOAA Directory. Over fifty CD-ROM titles contain global environmental data and information. Some titles are available on library network.

Access NOAALINC is available at 31 NOAA sites and on a dial-up basis using any communications software, pc and modem. The phone numbers are 301-713-4544 and 800-352-7281; the user id is ANSI. WWW: http://hpcc1.hpcc.noaa.gov/noaalib.html (info only)

Interfaces World Wide Web, NOAA home page contains weekly updates to new items added to the collection.

Standards Items in NOAA Directory are in DIF. Items in NOAALINC are in MARC.

User Assistance Reference Desk: 301-713-2600 x 124
               NOAALINC: 301-713-2600 x 132
                                     NOAALIB@LIBMAIL.lib.noaa.gov

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	3	3	3
Search	4	4	4
Browse	4	4	4
Order	4	4	4
Delivery	4	4	4

Global Change Information Service Node

Organization   National Technical Information Service   **September 28, 1994**

Data System FedWorld

Description/Purpose Provide Government information to the public, including GCDIS-type information. Dial-in modem/telnet/WWW access available.

Content Information on available paper copy reports, links to hundreds of the Government systems.

Access Modem: 703-321-8020, 9600 baud, n-8-1

Telnet: fedworld.gov (192.239.92.3)

FTP: ftp.fedworld.gov (192.239.92.203)

WWW: http://www.fedworld.gov

Interfaces TTY (ASCII), ANSI-BBS, FTP and http (World Wide Web) interfaces available.

Standards Many file types, including ASCII, gif, tiff and WordPerfect

User Assistance Online help, or voice available from 703-486-4608

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	X	X	X
Search	Some	More	
Browse	X	X	X
Order	X	More	
Delivery	X	More	

Global Change Information Service Node

Organization UCAR/NOAA Office of Field Project - Support Data Management Center   **August 30, 1994**

Data System Co-operative Distributed Interactive Atmospheric Catalog System (CODIAC)

Description/Purpose The CODIAC system offers scientists on-line access to research and operational atmospheric science datasets distributed across geographically dispersed data centers. The system provides the means to identify datasets of interest, the facilities to view associated metadata, and the ability to automatically obtain data and metadata via either Internet file transfer or removable media.

Content The data system currently provides access to carefully quality controlled datasets from research campaigns such as the U.S. Weather Research Program's STORM-FEST campaign, the GEWEX/GCIP Initial Dataset - 1 (GIDS-1), and the Central Equatorial Pacific Experiment (CEPEX). It also provides access to numerous operational datasets archived at NCDC via the OASIS node.

Access CODIAC may be accessed via either the Internet or modem. It currently supports both X-window and ASCII terminal interfaces. It may be accessed via Internet at:

Internet address: 128.117.90.53

user-id: storm

password: research

Modem access is provided via a modem bank at NCAR. Contact NCAR at 303-497-1278 to obtain a toll-free number for access. Data delivery media include Internet ftp and a variety of tape media. WWW: http://www.ofps.ucar.edu/codiac-www.html

Interfaces CODIAC currently provides catalog interoperability at Level III between the CODIAC and OASIS systems, and Level II interoperability to the NOAA and NASA Master Directories. An interface to Mosaic is under development. Linkages to EOSDIS are planned.

Standards CODIAC provides data in a number of standard formats by providing on-the-fly data format translation at the time of data download. Formats supported include E-BUFR, BUFR, GRIB, netCDF, and a variety of ASCII formats. Support for HDF will be provided in FY-1995.

User Assistance CODIAC provides an on-line user's tutorial and on-line help

Telephone support is available between 0700 and 1600 M-F at 303-497-8157 or 303-497-8167. E-mail for help to codiac@ncar.ucar.edu.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	4
Browse	2	1	1
Order	2	1	1
Delivery	1	1	1

Global Change Information Service Node

Organization Bureau of the Census/Center for International Research   **August 19, 1994**

Data System Center for International Research (CIR)

Description/Purpose The primary responsibilities of the Center for International Research are to keep abreast of demographic developments as they occur in all countries of the world and to conduct in-depth demographic and economic studies for selected countries.

Content The International Database (IDB) contains demographic, social, and economic statistics, by urban and rural residence, for all countries of the world, with primary emphasis on countries of Africa, Asia, and Latin America. A computerized data base management system allows for efficient mean of storage and rapid retrieval of the data. The Population Grid Cells data base contains estimates of country population by 20 minute by 30 minute grid cells for most countries of the world. Biennial reports are issued in the World Population Profile series and are available from CIR upon request at cost. Computer programs are developed for use in applying the many analytical techniques used for evaluating demographic data. A manual describing steps to following an analyzing census and survey data, including software to implement the process, has been released and will be published jointly with the United Nations. A major effort in the economics area involves the compilation, screening, and indexing of materials relating to various aspects of the economies of the Former Soviet Union and China. Results of the studies are presented in the Foreign Economic Report series and as CIR Staff Papers. The HIV/AIDS Surveillance Database contains information on HIV seroprevalence in population groups of developing countries.

Access The Population Grid Cells, HIV/AIDS Surveillance Database, and International Database will soon be available on-line through CIESIN's WWW server. To access CIESIN's data and information system through the Internet, telnet to catalog.ciesin.org. Instructions will be provided on how to use the system. For additional information, contact CIESIN User Services 517-797-2727. WWW: http://www.ciesin.org (info only)

Interfaces On-line interfaces are through CIESIN's WWW, gopher, ftp, and telnet servers.

Standards Information available through CIESIN.

User Assistance For technical assistance or information, contact CIESIN User Services (517) 797-2727.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	3	2	1
Search	3	2	4
Browse	3	2	1
Order	3	1	1
Delivery	3	1	1

Global Change Information Service Node

Organization Bureau of the Census/Regional Offices   **August 25, 1994**

Data System Regional Offices (RO)

Description/Purpose The Census Bureau's regional offices offer educational, inquiry, and reference services to organizations and the public. Information services specialists in the 12 offices assist data users across the country. They furnish information about Census Bureau reports and tape files, and make presentations at workshops and conferences. Content: Any Census Bureau product may be obtained or ordered from any of the 12 regional offices.

Access The 12 regional offices, phone numbers, and the States they serve are:

Boston, MA	617-424-0510	(CT, ME, MA, NH, NY*, RI, VT)
New York, NY	212-264-4730	(NY* New York City, Puerto Rico)
Philadelphia, PA	215-597-8313	(DE, MD, NJ, PA)
Detroit, MI	313-259-1875	(MI, OH, WV)
Chicago, IL	708-562-1740	(IL, IN, WI)
Kansas City, KS	913-551-6711	(AR, IA, KS, MN, MO, OK)
Seattle, WA	206-728-5314	(AK, HI, ID, MT, NV, OR, WA)
Charlotte, NC	704-344-6144	(DC, KY, NC, SC, TN, VA)
Atlanta, GA	404-730-3833	(AL, FL, GA)
Dallas, TX	214-767-7105	(LA, MS, TX)
Denver, CO	303-969-7750	(AZ, CO, NE, NM, ND, SD, UT, WY)
Los Angeles0, CA	818-904-6339	(CA)

* New York State is split between the Boston and New York Offices.

WWW: http://www.census.gov (info only)

Interfaces N/A

Standards N/A

User Assistance Information specialists in the Census Bureau's 12 regional offices offer assistance to data users. For questions about the Census Bureau's products and services, contact the regional office that serves your state.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	4	4	4
Search	4	4	4
Browse	4	4	4
Order	4	4	4
Delivery	4	4	4

Global Change Information Service Node

Organization Bureau of The Census/Data User Services Division   **August 16, 1994**

Data System Data User Services Division (DUSD)

Description/Purpose DUSD is responsible for helping data users find, acquire, understand, and use Census Bureau products and services. Major program activities include answering user inquiries; selling publications, microfiche and machine-readable products; managing the on-line data dissemination systems (CENDATA and BBS); and coordinating the State Data Center, Business Industry Data Center, and the National Census Information Center Programs.

Content DUSD is the clearinghouse for most of the Census Bureau's publications. Data users generally should order publications form the Government Printing Office or its bookstores, and data files, microfiche, and photocopies from Customer Services, DUSD. Excerpts from many reports are available via FastFax. Many current statistics, announcements of new products, and other information is available via CENDATA. Limited amounts of data are available via the Census Bureau's Internet node or electronic bulletin board. The Census Bureau plans on greatly expanding its data holdings on its Internet node in the future.

Access For information on products and services, contact Customer Services, DUSD (301-457-1216). Compuserve and DIALOG, offer CENDATA to their customers. for information about CENDATA content and on-line services, call: Compuserve (800-848-8199) or DIALOG (800-334-2564). For content information only, call Data Access and Use Branch, DUSD (301-457-1170). To access FastFax, dial 1-900-555-2Fax. A charge of $2.50 per minute is made while ordering; document transmittal time is free. The Census Bureau's Internet node can be accessed via Gopher, World Wide Web (html) browser, and anonymous File Transfer Protocol (ftp). For a graphics-based interface: http://www.census.gov/ or http://www.census.gov/index.html. For users with gopher Client software: gopher gopher.census.gov. Users can download files using ftp: ftp//ftp.census.gov/. Login as "anonymous" or "ftp". Use your e-mail address as the password. Change to /pub directory: ftp cd/pub. To access the electronic bulletin board dial 301-763-7554 (8-N-1).

Interfaces The Census Bureau's Internet node supports Gopher, Lynx, Mosaic, and ftp interfaces. All interfaces support automated linking with other data systems.

Standards Files are in ASCII format. They may be accessed by using Gopher, Lynx, Mosaic, ftp software, or by modem.

User Assistance Internet technical questions and comments should be directed to gatekeeper@census.gov. For additional help, call 301-457-1216.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	4	3	2
Browse	1	1	1
Order	3	2	1
Delivery	3	2	1

Global Change Information Service Node

Organization Bureau of The Census/Public Information Office   **August 11, 1994**

Data System Public Information Office (PIO)

Description/Purpose The Public Information Office has the responsibility of informing the public about the work of the Census Bureau, primarily through the Nation's news media and other communications networks. This falls into three main categories: 1) Promotion and publicity campaigns that elicit cooperation from the entire public or special segments of the public with specific Census Bureau censuses and surveys; 2) information programs that describe the results of those programs and communicate the availability of the resultant data to potential data users; and 3) public affairs programs that acquaint the public with the Census Bureau's work and with the usefulness of the data that flows from the programs in which they were asked to participate.

Content Prepares and issues some 200 press releases each year, reporting a wide spectrum of current demographic, economic, and social data from surveys and the Decennial Census. Produces and distributes information publications and brochures, exhibit materials, and radio and video products for broadcast. Census Bureau news releases are available electronically via the Internet.

Access News releases are available through the Census Bureau's Internet node. Fora graphics-based interface: http://www.census.gov or http:www.census.gov/index.html. For users with gopher client software: gopher gopher.census.gov. Through World Wide Web: gopher://gopher.census.gov or http://gopher.census.gov:70/. In addition, files are also available via anonymous ftp: ftp ftp.census.gov and via World Wide Web at: ftp://ftp.census.gov/pub

Interfaces The Census Bureau's Internet node supports Gopher, Lynx, Mosaic, and ftp interfaces. All interfaces support automated linking with other data systems.

Standards Census Bureau news releases are in ASCII format. They may be accessed by using Gopher, Lynx, Mosaic, and ftp software. The operating system is Unix and the programming language is "C" and Perl. The platforms are SunSparc 10's.

User Assistance User assistance is available via e-mail at pio@census.gov. Technical questions and comments should be directed to gatekeeper@census.gov. For additional help, call 301-457-2816 and ask to speak with one of the Public Information Offices's Public Affairs Specialist or by FAX at 301-457-3670.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	2	2	2
Search	4	3	2
Browse	2	2	2
Order	2	2	2
Delivery	2	2	2

Global Change Information Service Node

Organization Bureau of The Census/Data Information Centers   **August 25 , 1994**

Data System State Data Center Program, Business and Industry Data Center Program, and the National Census Information Center Program.

Description/Purpose The State Data Centers (SDC's) receive Census Bureau data products for their States and make the data and related services available to users. The Business and Industry Data Centers (BIDC's) also receive data products and complement the work of the SDC's. They focus especially on economic data and assistance to business and economic development agencies in their State. All States have SDC programs and many have also established BIDC programs. The Census Bureau furnishes data products, training in data access and use, technical assistance, and consultation to the data centers. They in turn, offer products and assistance to community leaders, planners, business people, and others. The Census Bureau sponsors the National Census Information Centers (NCIC) program, designed to give nonprofit organizations with a focus on minority concerns better access to census data. The NCIC program is a joint partnership between the Census Bureau and five national minority organizations to increase the benefits of census data to special population groups. Participants receive relevant Census Bureau data and disseminate them to their member organizations and the public.

Content Each individual center addresses a focused set of data needs which require specialized data and unique analysis

Access For information on how to access a specific center, contact the State and Regional Programs Branch, Data User Services Division, Bureau of the Census (301-763-1580). Several SDC's have migrated to the Internet. The Census Bureau's Internet node points to those States which have electronic on-line access. More and more States will make their data sets available via Internet in the near future. WWW: http://www.census.gov (info only)

Interfaces The Census Bureau's Internet node supports Gopher, Lynx, Mosaic, and ftp interfaces. All interfaces support automated linking with other data systems.

Standards Files are in ASCII format. They may be accessed by using Gopher, Lynx, Mosaic, ftp software, or by modem.

User Assistance For user assistance or contact information, contact the State and Regional Programs Branch, Data User Services Division, Bureau of the Census (301-457-1305). Internet questions and comments should be directed to gatekeeper@census.gov.

Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	4	3	2
Search	4	3	2
Browse	4	3	2
Order	4	3	2
Delivery	4	3	2

Global Change Master Directory

Recommendation IT07 of the "National Performance Review - Reengineering Through the Use of Information Technology" report directs the Department of Commerce through NOAA to organize a National Environmental Data Index (NEDI). This index will act as an environmental "yellow pages" directing citizens to all available data and information pertaining to the global environment, and will not be limited to the traditional research data and information archives. NEDI will be a topical directory that translates the specialized information currently available in a myriad of noninteroperable directories into common languages and makes that information meaningful to all users regardless of their science disciplines or sophistication.

NOAA recognizes that the Global Change Master Directory (GCMD) is a highly successful implementation of an Earth science directory. As such, the GCMD is considered a critical companion to NEDI, but not the only companion. It must be recognized that disciplines beyond Earth science are required to build an effective index to all federal data and information which pertains to the environment. Other directories, inventories, and on-line access systems have been implemented by the agencies which are beyond the scope or domain of GCMD.

The NEDI is not intended to replace GCMD or any of the several and unique data and information directories which now encompass facets of the environment beyond the Earth sciences. Instead, the NEDI will serve as a user-friendly umbrella under which existing and planned discipline directories will logically reside. NOAA foresees not a

duplication of effort to construct the NEDI, but rather a constructive interagency partnership to integrate disparate directories. Such a cooperative effort will require non-NOAA, as well as NOAA resources dedicated to the development and implementation of NEDI, and possibly the migration of existing directory structures and formats into new, more interoperable structures.

Federal Geographic Data Committee/National Spatial Data Infrastructure/ Government Information Locator System/National Environmental Data Index

The executive orders mandating new data management activities, such as FGDC, NSDI, GILS, and NEDI, across the Federal institutions can easily result in chaos for the agencies and groups attempting to implement GCDIS. The goals and priorities for each of the executive orders are slightly different (sufficient to cause divergence in the individual data management efforts if not properly coordinated). Each agency already has a number of different constituencies that they must respond to and recognize as their primary customers. The problems of adequate coordination are exacerbated by the plethora of interested groups and their sheer numbers. Additional resources are necessary to coordinate planning and implementation of these new activities, existing mission programs, and the GCDIS.

Resource Deficiencies

Data management resources in DOC are already being stretched to the limit by the flood of new data and greatly increased by the numbers of user requests and the complexity of those requests. The Administration's thrust to provide more, better and easier access to government information services for all customers, the public, business, education, and state and local governments requires major investments in new on-line systems, and improvements in the quality of the data assets. The National Information Infrastructure makes it possible for DOC to make more data available to greater numbers of users than thought possible a decade ago.

However, for DOC to participate fully in this new information society calls for every agency and Bureau to radically modify its current business practices. The re-engineering of many of the existing enterprises cannot be accomplished with the legacy systems. The individual agencies must embrace client/server solutions and distributed systems. The technology is there to help DOC, but change is expensive in terms of new hardware and software systems as well as redirecting and retraining in-house personnel.

The change affects customers also. The recognition of the need to broaden the scope of global change research to include demographic, sociological, and economic influences places many researchers at a disadvantage. They find themselves in uncharted waters, with unfamiliar data structures, unique parametric associations, and wonderful opportunities. There is a need for cross-discipline training in data management, to allow environmental researchers to understand the impact of shifting demographics and industrial activity on their measurements.

The vision of an interoperable GCDIS that is responsive to the global change researchers and the decision-makers can be achieved by the turn of the century if new funding can be made available. Progress can be made with the existing resources but it will be slight when compared with where GCDIS needs to go. The spirit of all the agencies involved is willing but the infusion of new money is necessary to turn the plans into reality.

Data Digitization

NOAA over the past few years has been undertaking a major effort to digitize its extensive paper records of environmental observations. However, over 110 million pages of data remain to be digitized. After extensive review by science teams, at least half of these have been determined to be high priority. With NOAA's existing digitization effort, those data cannot be completely converted before the middle of the next century and made available to global climate research. This effort must be accelerated through the development and application of new high speed scanning, and intelligent recognition systems.

Section VI

Appendix A
Acronyms

ASCII	American Standard Code for Information Interchange
AVHRR	Advanced Very High Resolution Radiometer
BIDC	Business and Industry Data Centers
C&GC	Climate and Global Change
CDC	Climate Diagnostic Center
CEES	Committee on Earth and Environmental Sciences
CENR	Committee on Environment and Natural Resources
CGED	Committee on Geophysical and Environmental Data
CIESIN	Consortium for International Earth Sciences Information Network
CMDL	Climate Monitoring and Diagnostic Laboratory
CODIAC	Cooperative On-Line Distributive Interactive Catalog
DBMS	Database Management System
DIF	Data Interchange Format
DOC	Department of Commerce
E-mail	Electronic Mail
EOSDIS VO IMS EOSDIS	Version 0 Information Management System
EOSDIS	Earth Observing System Data and Information System
EPIC	Extensive PMEL Information Collection

ESA	Economic and Statistical Administration
FGDC	Federal Geographic Data Committee
FTP	File Transfer Protocol
GAC	Global Area Coverage
GC	Global Change
GCDIS	Global Change Data and Information System
GCDMWG	Global Change Data Management Working Group
GCISN	Global Change Information Service Node
GCMD	Global Change Master Directory
GCOS	Global Climate Observing System
GIF	Graphics Interchange Format
GOLD	Geophysical On-Line Data
GOOS	Global Ocean Observing System
HDF	Hierarchical Data Format
HIV/AIDS	Human Immuno-deficiency Virus/Acquired Immune Deficiency Syndrome
HRPT	High Resolution Picture Transfer
HTML	Hypertext Markup Language
IGY	International Geophysical Year
JISAO	Joint Institute for the Study of Atmosphere and Ocean
JPEG	Joint Photographic Experts Group
LAC	Local Area Coverage
MGG	Marine Geology and Geophysics
MPEG	Multi-page Photographic Experts Group
NCDC	National Climatic Data Center
NEDI	National Environmental Data Index
NEDRES	NOAA Environmental Data Repository for Earth Sciences
NESDIS	National Environmental Satellite, Data, and Information Service
NetCDF	Unidata interchange format
NGDC	National Geophysical Data Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAALINC	NOAA Library and Information Network Catalog
NOAADIR	NOAA Directory
NODC	National Oceanographic Data Center
NOS	National Ocean Service
NSDI	National Spatial Data Infrastructure
NTIS	National Technical Information Services

NWS   National Weather Service

OASIS   On-line Access and Service Information System
OAR   Oceanic and Atmospheric Research
OMB   Office of Management and Budget
OSCAR   On-line Satellite Catalog Access and Retrieval System

PMEL   Pacific Marine Environmental Laboratory

SAA   Satellite Active Archive
SEG   Solid Earth Geophysics

TAO   Tropical Atmosphere-Ocean
TIROS   Television Infrared Observing Satellite
TOGA   Tropical Ocean-Global Atmosphere
TOVS   TIROS Operational Vertical Sounder

UCAR   University Corporation for Atmospheric Research
USGCRP   The United States Global Change Research Program
USWRP   U.S. Weather Research Program

WDC-A   World Data Center - A
WDCA   World Data Center - A
WWW   World Wide Web

Section VII

Appendix B
GCDIS Access Levels

Function	Level 1	Level 2	Level 3	Level 4
Connectivity	Data transfers to 1 Megabit per second	Data transfers to 1 Megabit per second	Voice-grade telephone line	Regular Mail
Search	Catalog system on line with gcd/i from all agencies described in accordance with GCDIS standards	Directory level infor and agncy gcd/i* documentation on line to GCDIS standards	Priority gcd/i* directory level info to GCDIS standards and gcd/i* documentation by hard copy to GCDIS standards	Existing directory level gcd/i* and hard copy documentation available to GCDIS
Browse	On line product generation	On line static browse products	Off line digital browse products	Off line hard copy browse products
Order	On line GCDIS integrated	On line with manual forwarding	Manual interface	Manual interface
Delivery	User choice, on/off line via standard formats	User choice, on/off line standard products	User choice of standard products	User choice of standard products
*gcd/i = Global Change Data and Information				

DOE GCDIS Implementation Plan

December 1995

Contents

Executive Summary

The Department of Energy's (DOE's) Global Change Data and Information System (GCDIS) Implementation Plan is one of nine agency-specific GCDIS implementation plans that have been prepared by the federal departments participating in the development of the GCDIS. The interagency GCDIS Implementation Plan[1] sets the stage for the agency plans and provides the background necessary to fully understand the program. The individual plans describe agency plans for global-change data and information management. These plans address the recommendations of the 1993 NAS Data Forum[2] and attempt to better inform those who need global-change data about the existence and availability of these data.

The GCDIS is an aggregate of existing and planned agency-mission-responsive data and information systems that have information relevant to the global-change user community. The enhanced interoperability of the agency systems is achieved through the use of standards, common approaches, technology sharing, and data policy coordination. The design of GCDIS focuses on providing service for a diverse community of global-change users: researchers, policymakers, educators, private industry, and private citizens. The objective is to aid the user community in learning what data and information are available, in having the key holdings available in useful forms with ready access, and in being assured of their quality and continued availability.

The GCDIS content reflects the broad range of global-change issues, including human and natural forcing factors, ecological change, biodiversity, human interactions, and comprehensive assessments. Thus, the data and information requirements encompass several disciplines as well as cross-disciplinary data sets. These requirements include traditional Earth-system information as well as coal and energy production, data on alternative energy sources, and energy- and resource-use options.

Because the DOE mission includes developing efficiency in energy use, diversity in energy sources, a more productive and competitive economy, and improved environmental quality, DOE data and information are critical assets for addressing the global-change issues. These DOE resources of information include both focused and contributing research programs.

Therefore, DOE will provide three focused and four contributing GCDIS data and information nodes. The focused nodes are the Atmospheric Radiation Measurement (ARM) Archive, the Carbon Dioxide Information Analysis Center, and the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center. The contributing nodes are the Energy Efficiency and Renewable Energy Network (EREN), the Energy Information Administration, the Environmental Measurements Laboratory, and the Office of Scientific and Technical Information. The Department also maintains a library system that includes Headquarters as well as the libraries in the DOE laboratories. These libraries primarily serve the research community at the sites, but many provide service to a broader customer base.

The ARM Archive includes data on radiative fluxes, temperature, atmospheric composition, and wind velocity for three highly instrumented sites located around the world. The Archive is in development and in the future will provide public access to data from the DOE ARM program, which addresses the radiation budget of the Earth and the radiative and other properties of clouds.

The Carbon Dioxide Information Analysis Center (CDIAC) acquires, compiles, quality-assures, documents, archives, and distributes data and other information concerning CO_2, other greenhouse gases, and climate change in support of DOE's Global Change Research Program (GCRP). CDIAC operates the World Data Center-A for Atmospheric Trace Gases. CDIAC identifies users' needs by working closely with the research community, the Global Change Research Program, policy makers, and others by attending workshops, reviewing the literature, and maintaining personal contacts. Data, models, and other products and services are evaluated for usefulness. Relevant ones available in a usable form are acquired; other packages considered relevant are compiled into a usable form at CDIAC. These products undergo extensive quality assurance and complete documentation in full coordination with the original supplier of the information. They are then made available to the research, policy-making, education, and corporate communities and to the public. In addition to data packages, CDIAC also produces and distributes newsletters, research summaries, and glossaries. CDIAC works with other data centers and individual researchers to promote the compilation and exchange of data.

The Energy Efficiency and Renewable Energy Network (EREN) is a multimedia World Wide Web server developed by the Department of Energy's Office of Energy Efficiency and Renewable Energy. EREN provides free electronic access to information from the Department, national laboratories, federal and state government agencies, utilities, nongovernment organizations, and commercial sources. This Internet-based system is a gateway to worldwide information sources that contain maps, images, video, sound, and text on energy efficiency and renewable-energy technologies.

The Energy Information Administration (EIA) is the independent statistical and analytical agency within the Department of Energy. As a part of its mission, EIA collects, analyzes, and disseminates data and information on the many aspects of energy production and consumption, providing a wealth of time-series data on energy use for the past 20 to 50 years and forecasts for the next 15 years. In addition to data on production and uses of each of the major fuels, which are useful for inferring greenhouse-gas emissions, EIA has in recent years added specific data, analyses, and forecasts of carbon and other emissions related to global climate change.

The Environmental Measurements Laboratory's Archival Databases consist of an active database (1963 to the present) of radionuclide measurements in the lower troposphere and two retrospective databases of radionuclide measurements in the stratosphere for 1957 through 1983 and trace-gas measurements in the stratosphere for 1973 through 1983.

The Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) serves as one of nine data centers supporting the National Aeronautics and Space Administration's (NASA's) Earth Observing System Data and Information System (EOSDIS). The ORNL DAAC

data holdings are primarily from ground-based field investigations, augmented by data collected through remote-sensing techniques. These data and information address the biological and physical processes and conditions that govern the storage and fluxes of energy, water, trace gases, carbon, nutrients, and other elements in and between ecosystems and the physical environment.

The Office of Scientific and Technical Information (OSTI) is the central point for collecting, processing, and distributing the scientific and technical information produced and acquired by Department of Energy programs. The OSTI holdings include information derived from DOE, other U.S., and international scientific and technical studies, work, or investigations related to energy production and use. A major objective of the Office is to ensure that industry and the public have easy and cost-effective access to DOE's scientific and technical information.

Section 4 of this report summarizes the products and services of the DOE nodes and lists the points of contact. These summaries include a brief description of the node, information on general holdings, how to access the holdings, interfaces, standards employed, and the availability of user assistance.

1. Introduction

The United States Global Change Research Program (USGCRP) was established to observe, understand, and predict global change and to make its results available for use in policy matters. Global-change research activities produce and require massive amounts of highly diverse data and information. Because global-change issues are so broad (they include human and natural forcing factors, ecological change, biodiversity, human interactions, and comprehensive assessment), the data and information needs are multidisciplinary. Thus, the challenge is to archive and preserve data and to make those data available in useful forms for researchers and other stakeholders.

To accomplish this, the federal agencies involved in the USGCRP have cooperated to organize the Global Change Data and Information System (GCDIS). That system builds on each agency's mission and resources and links each agency's data and information services to those of the other agencies and to the users. GCDIS is made interoperable by use of standards, common approaches, technology sharing, and data policy coordination.

The goal of GCDIS is to serve a diverse user community of global-change researchers, policymakers, educators, private industry, and private citizens. GCDIS will assist the user in identifying available data and information, will provide access to key holdings available in useful forms, and will ensure the quality of these holdings.

The Department of Energy (DOE) gathers, analyzes, and makes available many of the data sets and much of the information needed by the global-change user community. These data are produced by both focused and contributing research programs conducted as a part of the DOE mission.

DOE research activities are conducted by the DOE program offices, often involving other federal agencies and private institutions as well as international partners. The resulting global-change data and information are available through the following GCDIS nodes:

▶   the Atmospheric Radiation Measurement Archive,

▶   the Carbon Dioxide Information Analysis Center,

▶   the Energy Information Administration,

▶   the Energy Efficiency and Renewable Energy Network (EREN),

▶   the Environmental Measurements Laboratory,

▶   the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center,

- the Office of Scientific and Technical Information, and

- several DOE libraries.

These data and information are available on a variety of media, such as hard copy, compact discs, dial-in services, and Internet-accessible services.

This *DOE GCDIS Implementation Plan* is intended to inform users of global-change data and information and to assist agency implementation teams. It provides pointers to relevant DOE data resources and information service nodes, which are described in Sect. 4. The plan covers a 3-year period beginning with FY 1995. It will be updated as needed to reflect the current status of the implementation.

The service-node descriptions include levels of access that are defined by generic standards for each functional area. These levels are defined in Appendix A. A more complete definition can be found in the *U.S. Global Change Data and Information System Implementation Plan.*

Schedules for the implementation of these access levels for each information-service node are included in Sect. 3 to assist the user in tracking these changes. These enhancements to the service nodes will be accomplished as part of the existing budget in response to DOE's missions and initiatives to implement new executive directives, such as the National Spatial Data Infrastructure (NSDI), the Federal Geographic Data Committee (FGDC), the Government Information Locator Service (GILS), and the National Environmental Data Index (NEDI).

2. Department of Energy Overview

Mission: *The Department of Energy, in partnership with its customers, is entrusted to contribute to the welfare of the nation by providing the technical information and the scientific and educational foundation for the technology, policy, and institutional leadership necessary to achieve efficiency in energy use, diversity in energy sources, a more productive and competitive economy, improved environmental quality, and a secure national defense.*

POLICY FRAMEWORK

The DOE global-change program is a DOE mission area and thus has a policy framework to provide guidance for the research activities. DOE has identified policy issues that underlie the DOE research effort and define data requirements for the global-change program:

- What policy changes concerning greenhouse-gas emissions should be sought both in the United States and in international negotiations?

- What impacts will climate change have on the energy sector, ecosystems, etc.?

- How can DOE affect the underlying economic and technology forces that drive sustainability?

- What is the most effective strategy for meeting greenhouse-gas stabilization goals?

- What additional benefits are derived from policy actions to increase energy efficiency and/or to reduce greenhouse-gas emissions?

- What energy-sector strategies should be implemented to adapt to a potentially changing climate?

- What is the impact of climate-change policy on broad social and environmental policy issues, such as international trade, job formation, and economic competitiveness?

GLOBAL-CHANGE RELATED ACTIVITIES

The mission of the Department's Global Change Research Program is to estimate the future levels and the rate of increase in atmospheric carbon dioxide (CO_2) and other energy-related emissions and to understand and predict the potential effects of emissions on climate and biota. This information is required to scientifically underpin energy-policy options aimed at preventing, mitigating, or adapting to increasing greenhouse-gas concentrations and to global environmental change.

The objective of the DOE program is to elucidate the processes controlling the global carbon cycle and to predict future levels of atmospheric carbon dioxide; determine how changes in concentration of greenhouse gases may change the Earth's radiation balance; acquire the data and develop the models needed to determine how changes in the Earth's radiation balance may change climate at global and regional scales and to predict rates of climate change; develop the scientific methodology required to determine and quantify the combined effect of climate change and greenhouse-gas concentrations on the biosphere.

In addition to focused research, DOE conducts research related to energy issues, including studies of

- chemical processes in the atmosphere related to energy production and use;

- the lower atmospheric boundary layer;

- solid-earth processes related to the formation of energy resources and to possible changes in surface interactions;

- long-term solar interactions with the Earth;

- basic plant and microbial biology;

- technologies to improve energy conservation, energy efficiency, and alternative energy technologies to reduce or replace carbon-based fuels for energy production; and

- international-environmental-policy options.

The DOE's Energy Information Administration also conducts an extensive data collection and analysis program concerning energy production and consumption.

Thus, the DOE data- and information-management role is to provide stewardship for energy-related data and information relevant to global change, both focused and contributing. These resources include models, published literature, measured data, model-derived data, and socioeconomic data.

GCDIS PROGRAM OFFICE SPONSORS

The Department of Energy manages a major part of the Nation's federally funded civilian science, technology development, and engineering activities. These activities are carried out at the DOE facilities (9 major multiprogram laboratories, 10 single-purpose laboratories, 11 smaller special-mission laboratories, and a wide range of special user facilities), at universities, and with other organizations and industry.

4

The DOE research activities are divided by program areas under the purview of the funding program offices. Program offices sponsoring GCDIS nodes that will provide access to DOE data and information are the Office of Energy Research, Office of Energy Efficiency and Renewable Energy, Energy Information Administration, Environmental Measurements Laboratory, and Office of Science Education and Technical Information.

Office of Energy Research

The programs of the Office of Energy Research fund basic research to advance the fundamental science knowledge base as well as to train future scientists. Energy research provides insights into fundamental science and associated phenomena and develops new or advanced concepts and techniques. Research in the natural and physical sciences has been supported by DOE and its predecessors for more than 40 years, including high-energy and nuclear physics, magnetic fusion energy, health and environmental sciences, and basic energy sciences (i.e., materials, chemical, and applied mathematical sciences; engineering and geosciences; energy biosciences; and other activities). These basic research programs help build the science and technology base that underpins energy development by government and industry.

Office of Energy Efficiency and Renewable Energy

The goal of the Office of Energy Efficiency and Renewable Energy (EE) is to develop cost-effective energy efficiency and renewable-energy technologies that protect the environment and support the nation's economic competitiveness. EE achieves this goal through a strong and balanced program of research, development, and market deployment through private-sector partnerships. EE is organized around the four main energy users (utilities, industry, transportation, and buildings) and it has an outreach arm for technical and financial assistance. This orientation toward end users has helped the technology-development programs focus on addressing the needs of the energy marketplace, which is especially important given the DOE projections that, by 2030, renewables could supply as much as 28% of the nation's energy use.

Energy Information Administration

The Energy Information Administration (EIA) is the independent statistical and analytical agency within DOE. As a part of its mission, EIA collects, analyzes, and disseminates data and information on the many aspects of energy production and consumption, providing a wealth of time-series data on energy use for the past 20 to 50 years and forecasts for the next 15 years. In addition to data on the production and uses of each of the major fuels, which are useful for inferring greenhouse-gas emissions, EIA has recently added specific data, analyses, and forecasts of carbon and other emissions related to global climate change.

The Department of Energy Organization Act of 1977 consolidated the legislative mandates that establish EIA as the single U.S. Government authority for energy information. More recently, the Clean Air Act Amendments of 1990 and the Energy Policy Act of 1992 (EPACT) have added

a global-change-related focus to EIA's information programs. For example, EPACT includes a requirement that EIA compile an inventory of greenhouse-gas emissions.

Environmental Measurements Laboratory

The Environmental Measurements Laboratory conducts environmental research concerning pollutants associated with energy technologies and related national-security activities, principally for the purpose of providing the scientific information required to determine the consequent effects on human health and the environment. EML's study of nonradioactive pollution covers many phases: source terms, transport within the atmosphere, deposition processes, and accumulation in ecosystems. EML also studies the natural radiation environment to provide baseline data against which anthropogenic (man-made) radiation levels can be measured. During the past 40 years, EML has pioneered and refined state-of-the-art methods of pollution detection and has compiled a consistent record of achievement in the area of chemical analysis.

Office of Science Education and Technical Information

The Office of Science Education and Technical Information provides leadership in leveraging the Department's scientific and technical resources to enhance global competitiveness and the development of a diverse, well educated, scientifically literate workforce. It provides timely scientific and technical information services and educational assistance to a wide range of customers. Its Office of Scientific and Technical Information (OSTI) is the central point for collecting, processing, and distributing the scientific and technical information produced and acquired by the DOE programs. Collecting information from the Department's research and development activities and through numerous domestic and international exchange agreements, OSTI is a major U.S. source of information derived from scientific and technical studies, work, or investigations related to global change. A major objective of the Office is to ensure that industry and the public have easy and cost-effective access to DOE's scientific and technical information.

3. DOE Data and Information Management

DOE data- and information-management responsibilities are distributed among the program offices. The focused global-change data-management activities are based in the Office of Energy Research. The focused data-management activities are closely linked to the DOE global-change research activities to provide research guidance in identifying data requirements and in developing priorities. An *ad hoc* working group composed of representatives from the cognizant program offices will coordinate DOE GCDIS activities.

MANAGEMENT STRUCTURE

Data management is an integral part of DOE research activities. The CDIAC mission has evolved over the past years to better respond to DOE and national research priorities. The ARM research program, which conducts research at 9 DOE national laboratories, 13 other federal organizations, and 21 universities, has developed a data-management system to better respond to both researchers and the general public.

ARM Data Management

The ARM Program provides a production computing environment for the collection, analysis, and delivery of atmospheric data and analysis products to scientists around the country. Data are received from ARM Cloud and Radiation Testbed (CART) sites and from external agencies. ARM data management involves researchers from DOE laboratories, other agencies, and universities. Software applications are run to determine the quality of the data and to create data streams important to evaluating and modeling the radiative effects of clouds on the climate. Software applications are being developed with the aid of high-speed, vectorized computer systems to provide quality control and analysis of data, to perform data fusion of surface observations to create area average values, and to assimilate vertical profiles of meteorlogical variables into three-dimensional grids. Data are received and processed continually, and tailored data products are delivered to ARM scientists based upon their data requests. The Experiment Center at Pacific Northwest National Laboratory processes ARM data and serves ARM investigators. Data are archived daily to a mass-storage data system at Oak Ridge National Laboratory for long-term access by the general scientific community. The ARM Program is unique in that it is the only atmospheric field program providing customized data products to its scientists in near real-time on a continuing basis.

Carbon Dioxide Information Analysis Center

The Carbon Dioxide Information Analysis Center (CDIAC) acquires, compiles, quality-assures, documents, archives, and distributes data and other information concerning CO_2, other greenhouse gases, and climate change in support of DOE's Global Change Research Program. CDIAC operates the World Data Center-A for Atmospheric Trace Gases. CDIAC identifies users' needs

by working closely with the research community, the Global Change Research Program, policymakers, and others by attending workshops, reviewing the literature, and maintaining personal contacts. Data, models, and other products and services are evaluated for usefulness. Relevant ones available in a usable form are acquired; other packages considered relevant are compiled into a usable form at CDIAC. These products undergo extensive quality assurance and complete documentation in full cooperation with the original supplier of the information. They are then made available to the research, policy-making, education, and corporate communities and to the general public. In addition to data packages, CDIAC also produces and distributes newsletters, research summaries, and glossaries. CDIAC works with other data centers and individual researchers to promote the compilation and exchange of data.

Environmental Measurements Laboratory

The EML archival radioactivity database is under development and, when completed, will be integrated into the collection at CDIAC. The samples of stratospheric and upper-tropospheric radionuclides that form the basis of the RANDAB database are inventoried and stored at EML and are easily retrieved for future use by the research community.

The Surface Air Sampling Program of EML continues to collect, analyze, and store the resulting data on a computer at EML. The database will ultimately be deposited at CDIAC.

Energy Information Administration

The National Energy Information Center (NEIC) is the information-access and -dissemination arm of the Energy Information Administration. NEIC responds to inquiries from Congress; federal, state and local agencies; industry; the press; and the general public regarding energy markets and industries in the United States and around the world. NEIC provides responses to inquiries received via telephone, fax, e-mail, written correspondence, and onsite visits. NEIC also assists inquirers in accessing EIA electronic information products and services. These include EIA's Internet sites (World Wide Web, FTP, and gopher), online databases and computer models on the Electronic Publishing System (EPUB) bulletin board, CD-ROMs, and public-use diskettes and tapes. The EIA Web site provides electronic access to a vast array of EIA data on energy production and demand, energy prices, and energy resources. EIA's FTP server, accessible directly as well as from the Web site, more efficiently accommodates file transfer of larger databases and files.

Energy Efficiency and Renewable Energy Network

The Energy Efficiency and Renewable Energy Network (EREN) is a multimedia World Wide Web server developed by DOE's Office of Energy Efficiency and Renewable Energy. EREN provides free electronic access to information from the Department, national laboratories, federal and state government agencies, utilities, nongovernment organizations, and commercial sources. This Internet-based system is a gateway to worldwide information sources that contain maps, images, video, sound, and text on energy efficiency and renewable-energy technologies

Office of Scientific and Technical Information

OSTI collects information produced in the Department's R&D program as well as additional scientific and technical information needed by the Department and makes it available to the Department, other government agencies, and the public by a variety of mechanisms. The Department's information holdings are announced in bibliographic databases that are publicly available on DIALOG and STN. DOE technical reports are placed with the National Technical Information Service for public access. Software developed at departmental facilities is collected, announced, and made available to the public. OSTI also operates a publicly accessible World Wide Web server that gives general information about the Department, links to many other departmental elements, provides search capability (via WAIS) of some databases, and lists specific information about OSTI products and services.

USER ADVISORY PROCESS

The various communities of users of DOE global-change data and information serve either as formal or informal advisors for the DOE data-management activities. In the focused programs strong links exist between the data and research activities to ensure that the researchers' requirements and advice are integrated into data-management strategic planning. In the ARM program, for example, the ARM Science Team provides the requirements for the development of data products. These researchers also provide feedback on quality-control measures for the data system.

User feedback mechanisms are also central elements in the design and implementation of the World Wide Web applications of the contributing programs.

The National Data Centers and World Data Centers have scientific advisory panels, such as the National Research Council's Committee on Geophysical and Environmental Data, which as been in place for some time. This infrastructure also has review panels that are made up of scientists from other federal agencies, universities, and national laboratories.

SCHEDULE

Connectivity

Currently, 70% of the DOE nodes are accessible via Internet at T-1 speeds. By the end of this fiscal year, all will be accessible via Internet. The Department is currently upgrading its Internet capability to T-3 across the complex. These nodes also provide voice and fax access for those users who do not have Internet capabilities.

Search and Browse

The Global Change Master Directory currently lists all the CDIAC holdings. The other focused and contributing data sets will be referenced through implementation of other federal initiatives,

such as the Office of Management and Budget's Circular A-130, the Federal Geographic Data Committee, and the Committee on the Environment and Natural Resources' National Environmental Data Index.

Order and Delivery

The CDIAC data holdings are available free of cost and are currently available via FTP, e-mail requests, and mail or voice requests. The ARM Archive is in development but will provide online ordering by 1996. DOE will provide more-sophisticated tools and will participate in interagency efforts to provide more-cost-effective tools and to develop a generic tool for the user.

BUDGET

Data-management activities are integral to the DOE focused global-change program with two centers, CDIAC and the ARM Archive, designated to disseminate information beyond a specific research activity. CDIAC provides a service that is not specific to a given activity; its budget has been included in data management for NSTC/SGCR crosscuts. The contributing programs provide data and information to global-change users through their base programs.

4. System Overview

In addition to the seven GCDIS nodes described in Chapter 3:

- ► ARM Archive
- ► Carbon Dioxide Information Analysis Center
- ► ORNL DAAC
- ► Energy Efficiency and Renewable Energy Network
- ► Energy Information Administration
- ► Environmental Measurements Laboratory
- ► Office of Scientific and Technical Information

the Department of Energy also has a network of libraries that provide access to global-change information. Most of these libraries are located at the many DOE research facilities scattered across the country, and they range in size from small collections to massive information resources. The Department's system of libraries are also a source of relevant information. Although the primary function of these facilities is to support the research activities at the respective sites, many provide services to a broader community through Internet services for public access and via library networks.

The remainder of this chapter describes in detail the types of information that are available from each of the DOE GCDIS nodes and from the larger of the DOE libraries, gives points of contact for each installation, indicates the level of public availability of each library, lists the means of electronic access available, specifies what communication standards have been adopted, and (where appropriate) provides the schedule of implementation for each node of the DOE GCDIS system.

Organization Office of Energy Research

Data System Atmospheric Radiation Measurement (ARM) Archive

Description:

Oak Ridge National Laboratory (ORNL) is responsible for the design, development, and operation of the ARM Archive that will store and distribute atmospheric data gathered during the ARM project. This center is under development and therefore is operating in a limited capacity.

Contents:

ARM focuses on data about and improved parameterizations of clouds and their interactions with solar and terrestrial radiation. These data are gathered through ground-based, airborne (manned and unmanned), and satellite platforms at or relating to three sites (the southern great plains of the United States, the tropical western Pacific Ocean, and north slope of Alaska). The data result from measurements of radiative fluxes (solar and infrared); advective and surface fluxes of moisture, heat, and momentum; cloud types, composition, and distribution (depth, fractional coverage, and layering); thermodynamic properties of the columnar air mass (temperature, pressure, and concentrations of all three phases of water); the state and characteristics of the underlying surface (the lower boundary condition); precipitation, evaporation, and the production of condensation nuclei; and radiatively significant particulates, aerosols, and gases.

Access:

Currently, the ARM Archive only supports the ARM project scientists and staff. The design includes Internet access for the general user community. In the interim, users are welcome to contact the ARM Archive by phone, fax, mail, or e-mail for information. All data will be provided free of charge. Help in retrieving data and information from the ARM Archive is available from User Assistance.

Mail: ARM Archive User Service
        P.O. Box 2008, MS 6490
        Oak Ridge National Laboratory
        Oak Ridge, TN 37831-6490
Voice: 423-241-3952
Fax: 423-574-4665
Internet: http://www-armarchive.ornl.gov

Standards:

The NetCDF and HDF data-file format and transfer standards are adhered to. The mass-storage system conforms to the IEEE mass-storage reference model (National Storage Laboratory). Network access is via standard TCP/IP and FTP protocols. Open-system-architecture (Unix) platforms are used to manipulate data.

User Assistance:

Mail: ARM Archive User Service
         P.O. Box 2008, MS 6490
         Oak Ridge National Laboratory
         Oak Ridge, TN 37831-6490
Voice: 423-241-3952
Fax: 423-574-4665
Internet: http://www-armarchive.ornl.gov

Implementation Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	2	2	2
Browse	3	3	2
Order			
Delivery	1	1	1

Organization Office of Energy Research

Data System Carbon Dioxide Information Analysis Center (CDIAC)

Description

CDIAC acquires or compiles, quality assures, documents, archives, and distributes data and other information concerning carbon dioxide and other greenhouse gases in relation to climate change. CDIAC provides technical support for users in the general research, policy-making, education, and corporate communities and in the general public. CDIAC participates in three major bilateral agreements: the U.S.-Russia Agreement on Protection of the Environment, the U.S.-China Agreement on Joint Research on the Greenhouse Effect, and the Japan-U.S. Science and Technology Agreement. CDIAC products include numeric data packages; and computer model packages; reports related to carbon dioxide; the DOE Research Summary series (four-page topical highlights); the newsletter *CDIAC Communications*; and the series *Trends: A Compendium of Data on Global Change.* CDIAC operates the World Data Center-A for Atmospheric Trace Gases, a component of the World Data Center System of the International Council of Scientific Unions.

Content

Data and information products include the following subject areas: concentrations of carbon dioxide and other greenhouse gases in the atmosphere and oceans; emissions of carbon dioxide from fossil-fuel combustion and cement manufacture; carbon content of ecosystems and fluxes of carbon to the atmosphere from changes in land use; long-term global, regional, and U.S. climate records; U.S. coastal areas at risk from rising sea levels; and the response of vegetation to rising atmospheric levels of carbon dioxide.

Access

Users are welcome to contact CDIAC by any convenient and available means, including mail, phone, fax, and e-mail. CDIAC maintains an anonymous FTP area; users are welcome to browse this area and to download numeric data and metadata files. CDIAC also maintains a home page on the World Wide Web, through which its data and information can be accessed. Requests for some CDIAC data can also be submitted via the ORNL Distributed Active Archive Center (see above). All data and information products distributed by CDIAC are provided at no cost to the user.

Mail:	Carbon Dioxide Information Analysis Center
	Building 1000, MS-6335
	Oak Ridge National Laboratory
	P.O. Box 2008
	Oak Ridge, TN 37831-6335
Voice:	423-574-0390
Fax:	423-574-2232
Internet:	cdiac@ornl.gov

Interfaces

Printed catalogs of the data and information holdings are available on request. The address of CDIAC's anonymous FTP area is cdiac.esd.ornl.gov. The URL of CDIAC's home page on the World Wide Web is http://cdiac.esd.ornl.gov/cdiac.

Standards

Open-system-architecture (Unix) platforms are assigned to processing data, SAS statistical and graphical software packages are employed to manipulate and quality-assure data, and standard media are used. Internet access is via standard TCP/IP and FTP protocols.

User Assistance and Referral Services

Mail:	Carbon Dioxide Information Analysis Center
	Building 1000, MS-6335
	Oak Ridge National Laboratory
	P.O. Box 2008
	Oak Ridge, TN 37831-6335
Voice:	423-574-3645
Fax:	423-574-2232
Internet:	cdp@ornl.gov

Implementation Schedule

CDIAC data sets are fully quality assured and documented to GCDIS standards; as an additional service to data contributors and its user community, CDIAC also makes available selected data sets that are distributed essentially as received and are minimally documented by CDIAC. Because access to its data is supplied through the NASA EOSDIS network, access is considered to be of GCDIS quality. All CDIAC data sets are listed in the *GCDIS Master Directory*.

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	3	3	3
Order	2	2	2
Delivery	1	1	1

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Organization Office of Energy Research

Data System Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC)

Description

The ORNL DAAC serves as one of nine data centers supporting the National Aeronautics and Space Administration's (NASA's) Earth Observing System Data and Information System (EOSDIS). For a more detailed description of the DAAC system, see the *NASA Implementation Plan*. The ORNL DAAC gathers, quality assures, documents, archives, and distributes data and data products in support of NASA and other global-change research and policy-making efforts.

Content

Data holdings are primarily from ground-based field investigations, augmented by data collected through remote-sensing techniques. These data and information address the biological and physical processes and conditions that govern the storage and fluxes of energy, water, trace gases, carbon, nutrients, and other elements in and between ecosystems and the physical environment. The ORNL DAAC also includes data from the Oregon Transect Ecosystem Research Project (OTTER) and the First ISLSCP Field Experiment (FIFE).

Access

All data and information are provided at no cost to the user. Data and information are offered to users via an online interface as well as by telephone, fax, e-mail, and mail. Users may also contact the DAAC to request hardcopy output or assistance for retrieving electronic data. The DAAC can provide its data on the standard suite of EOSDIS-approved media [i.e., 9-track tape, 8-mm tape, 4-mm tape, 3480 tape cartridge, online (volume-limited), and prepublished CD-ROM]. Other media (e.g., 3490 tape cartridges, 3.5- and 5.25-in. diskettes, and Bernoulli cartridges) are also available.

Mail: ORNL DAAC User Services Office
           P.O. Box 2008, MS 6490
           Oak Ridge National Laboratory
           Oak Ridge, TN 37831-6490

Voice: 423-241-3952
Fax: 423-574-4665
Internet: ornldaac@ornl.gov or ornl@eos.nasa.gov

Interfaces

The nine EOSDIS data centers form a physically distributed data distribution system that has been integrated into one entity through a System-Wide Information Management System (IMS).

Users may access the ORNL DAAC either through the System-Wide IMS or directly through the ORNL DAAC's local user interface. The System-Wide IMS is a client-server system with a client installed at each of the nine DAACs. Metadata from all data centers can be queried, and data sets can be ordered, regardless of where the data actually reside. Users may also access the ORNL DAAC through the ORNL DAAC Local IMS. Similar to the System-Wide IMS, the ORNL DAAC Local IMS is a search-and-order system that allows the user to identify and request data archived at the ORNL DAAC. The local IMS complements the functions available at the system-wide level.

Metadata available from both interfaces include: data in the dataset, data-collection source or platform, instruments and sensors used, data collectors, associated projects, geographic information, etc. The ORNL DAAC Local IMS provides the EOSDIS IMS search capabilities as well as additional capabilities, such as Boolean selection processes.

Standards

The HDF data file format and transfer standard is adhered to. The mass-storage system conforms to the IEEE mass-storage reference model (National Storage Laboratory). Access to the archive is via standard TCP/IP FTP protocols and through a DAAC system-wide X-Windows graphic interface and character interface and through an ORNL-DAAC-specific X-Windows interface. Open-system-architecture (Unix) platforms are used to manipulate data.

User Assistance Services

Mail: ORNL DAAC User Services Office
          P.O. Box 2008, MS 6490
          Oak Ridge National Laboratory
          Oak Ridge, TN 37831-6490
Voice: 423-241-3952
Fax: 423-574-4665
Internet: ornldaac@ornl.gov or ornl@eos.nasa.gov

Implementation Schedule

The ORNL DAAC is fully operational and meets the GCDIS standards for functionality.

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	1	1	1
Order	1	1	1
Delivery	1	1	1

Organization Office of Energy Efficiency and Renewable Energy

Data System Energy Efficiency and Renewable Energy Network (EREN)

Description

EREN provides a gateway to electronic sources of information on energy efficiency and renewable energy. Through a single point of contact, it allows Internet access to a variety of information sources, including national laboratories, trade associations, bulletin boards, and commercial databases. EREN, a multimedia World Wide Web server, links to other Web sites, gopher sites, FTP sites, bulletin boards, databases, documents, LISTSERVs, forums, and USENET groups that contain information on energy efficiency and renewable energy.

Content

EREN provides access to departmental publications, bibliographic information, databases, and data files, such as maps, images, audios, and videos. In addition, EREN connects to bulletin boards, such as FEDWORLD, the Energy Ideas Clearinghouse Bulletin Board Service at the Washington State Energy Office, and the Energy Regulatory Matters Information Service at the Michigan Public Utilities Commission. Currently, more than 80 resources may be accessed by browsing through an alphabetical listing of Internet sites, broad subject divisions, types of services, or types of organizations providing material.

Additional sources of electronic information on energy efficiency and renewable energy that are not currently on the Internet are identified in EREN's New Energy Information Locator (NEIL) database. NEIL provides content, subject, producer, and availability descriptions of each source.

Access

The URL for EREN is http://www.eren.doe.gov.

Interfaces

Interfaces between EREN and other nodes are handled through the data servers. EREN's home page and some of its data are located at Argonne, while the majority of its data is located at NREL. The bulk of data accessible through EREN is located at other, non-EREN sites. Access to EREN data and other WWW sites is accomplished through WWW hyperlinks, WAIS searches, gopher links, telnet sessions, and FTP file transfers.

Standards

Access to EREN is via standard TCP/IP, FTP, WAIS, and HTTP protocols. Open-system-architecture (Unix) platforms are used. XMosaic, WinMosaic, MacMosaic, Lynx, Cello browsers are supported. The GIF, JPEG, and MPEG formats are employed.

User Assistance Services

In addition to energy-efficiency and renewable-energy resource information, EREN provides many user-oriented features, such as an online tutorial for new users, a chronological listing of additions and changes to the system, and a customer-feedback screen, which allows the user to suggest improvements, new data sources, and data usefulness.

Implementation Schedule

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	n/a	n/a	n/a
Order	1	1	1
Delivery	1	1	1

Organization Office of Scientific and Technical Information (OSTI)

Data System Integrated Technical Information System (ITIS)

Description/Purpose

ITIS is an online information-retrieval system for searching bibliographic databases maintained by OSTI. Those databases include references to scientific and technical information and reports that are produced by DOE-funded research and other U.S. and international sources and that are needed by DOE researchers and program managers.

Content

Databases in the ITIS system include

▸ Energy Science and Technology Database (the EDB, which contains bibliographic references to the published literature, including reports and conference proceedings)

▸ Research in Progress (DOE RIP)

▸ Foreign Research in Progress

▸ Energy Science and Technology Software Database (references to computer codes available from the ESTS Center)

Access

ITIS is available to DOE, DOE contractors, and other U.S. Government agencies by Internet or dialup connections. Most of the ITIS databases are publicly available from commercial database vendors (DIALOG and STN)

User Assistance

OSTI maintains a user hotline for assisting ITIS users; the telephone number is 423-576-1222.

Organization Office of Scientific and Technical Information (OSTI)

Data System OSTI World Wide Web Server

Description/Purpose

The OSTI World Wide Web Server provides unrestricted Internet access to selected portions of the ITIS databases, the full texts of some DOE documents, and links to other DOE facilities and information.

Content

The server contains the full text of DOE Technical Standards, bibliographic references to scientific and technical publications, descriptions of available DOE/NRC software, full text of DOE Order/Guide on technical information management, information on DOE mission/goals, and links to other DOE offices, sites, and laboratories.

Access

The server's URL is http://apollo.osti.gov/home.html.

Schedule

The server became active in June 1994. Database access through the server became available in August 1994. Additional databases and the full texts of documents will be added during 1994-1995.

Function	FY 1994	FY 1995	FY 1996
Connectivity	1	1	1
Search	1	1	1
Browse	n/a	n/a	n/a
Order	3	3	3
Delivery	1	1	1

Organization: Energy Information Administration

Description

The Energy Information Administration (EIA) is an independent statistical and analytical agency within the U.S. Department of Energy. EIA maintains a comprehensive data and information program relevant to energy resources and reserves, energy production, energy demand, energy technologies, and related financial and statistical information. EIA's mission is to provide high-quality, policy-independent energy information to meet the requirements of government, industry, and the public in a manner that promotes sound policy-making, efficient markets, and public understanding.

Content

The EIA collects and publishes data and prepares analyses on energy consumption, prices, resources, and projections of energy supply and demand. EIA maintains a comprehensive program relevant to energy resources and reserves, energy production and demand, energy technologies, and related financial and statistical information relevant to the adequacy of energy resources to meet the nation's demands in the near- and longer-term future. EIA's mission was expanded under the Energy Policy Act of 1992 to include new data-collection efforts concerning the use of nonpetroleum transportation fuels and the vehicles that use them. EIA compiles information on alternative-fuel vehicles in use, greenhouse-gas emissions from such vehicles, and replacement fuels over the life cycles of the vehicles. EIA also maintains an inventory of national aggregate emissions of greenhouse gases for a multiyear timeline.

EIA has established the Voluntary Reporting of Greenhouse Gases Program to record activities that reduce emissions of greenhouse gases or increase carbon fixation or sequestration. The reporting program accommodates reporting at several levels, including:

- A comprehensive accounting of all emissions from a reporting entity for 1987 to 1990. This entity-level report will establish a baseline for comparing future emissions and emission reductions.

- Entity-wide emissions and reductions for 1991 onwards.

- Individual emission-reduction projects, such as:
  Operating more-efficient vehicles
  Replacing lighting fixtures or appliances with more efficient ones
  Fuel switching
  Recovering methane from landfills
  Forest preservation and tree planting
  Recycling

▶ Future commitments to reduce emissions of greenhouse gases, undertaken through local and national voluntary reduction programs

The information collected through the Voluntary Reporting of Greenhouse Gases Program will be available through a public-use database. Public access to the data will support educational exchanges, inform public-policy development, and encourage public recognition of reported efforts. The database is designed to preserve data on emissions, emission reductions, and sequestration achievements.

Access

The EIA Through the, EIA provides data and information to users in a variety of means:

▶ Its National Energy Information Center (NEIC) responds to inquiries received by
    phone: 202-586-8800
    fax: 202-586-0727
    e-mail: infoctr@eia.doe.gov
    mail:
      NEIC/EIA, EI-231
      1000 Independence Ave., SW
      Washington, DC 20585

▶ Its Electronic Publishing System (EPUB) is a free electronic bulletin board.

▶ EIA data and information are accessible over the Internet via connections to an FTP site server at ftp://ftp.eia.doe.gov; a gopher site (gopher://gopher.eia.doe.gov); and a World Wide Web site (http://www.eia.doe.gov).

▶ EIA makes publications, data files, and models available for public purchase through the National Technical Information Service, the Office of Scientific and Technical Information, and the Government Printing Office. In addition, some categories of customers are eligible to receive EIA information products free of charge. Contact NEIC for more information.

Organization: Environmental Measurements Laboratory

Data System: Retrospective Stratospheric Databases RANDAB and TRACDAB

Description:

DOE's Environmental Measurements Laboratory (EML) is in the process of computerizing the world's largest collection of stratospheric and upper tropospheric radionuclide data ever compiled. This database (RANDAB) will complement the existing EML trace-gas database (TRACDAB). These unique databases contain valuable information regarding the fate of radioactive material that was introduced into the atmosphere by the atmospheric testing of nuclear weapons. They also contain data on naturally occurring radioactivity. These data will be useful for testing global-climate and atmospheric-chemistry models.

Contents:

RANDAB will incorporate the results of measurements made from 1957 to 1983 under Projects Ashcan, Stardust, and Airstream. More than 50,000 filters were collected during this period and analyzed for up to 20 radionuclides. All of the available data associated with each filter is also included in RANDAB. EML anticipates having RANDAB online early in 1996 through DOE's Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory.

EML will enhance RANDAB by creating an inventory of its archived filter samples. In projects Airstream and Ashcan, usually one-third of each filter was put away for future use. This database will be very useful for future research programs requiring the analysis of long-lived radionuclides.

EML also has CO_2 separated stratospheric air samples from Project Airstream for approximately 1 year (1978). They will be added to the RANDAB inventory for ^{14}C analyses for possible use in global-climate research.

EML will then produce a database from its other surface sampling programs, including data from surface radioactivity measurements, 1954–1993; ^{90}Sr deposition measurements, 1954–1993; soil sample collection, 1953–1990; diet and bone sampling, 1969–1982; and sediment sampling, 1979–1991.

EML's stratospheric database of trace gases (TRACDAB), collected during Project Airstream, has been completed and is available from EML. This database contains information on more than 1000 samples. Each sample was analyzed for one or more of the following gases: CCl_3F, CCl_2F_2, CCl_4, N_2O, SF_6, CO_2, CH_4, CH_3CCl_3, and COS.

Access:

EML's RANDAB is under development and ultimately will reside at CDIAC. TRACDAB has been sent to CDIAC and will shortly be incorporated into their active retrieval databases.

Organization: Environmental Measurements Laboratory

Data System: Surface Air Sampling Program (SASP)

Description:

Historically, the objective of this program is to track atmospheric nuclear debris on a global scale and to assess the potential health hazards of this debris. Today, while the program continues to be poised to instantly respond to the introduction of radioactivity into the atmosphere, a new focus is on the use of naturally occurring radionuclides as atmospheric tracers.

Contents:

This work emphasizes ^{7}Be, which is produced in the upper troposphere and lower stratosphere, and ^{210}Pb and ^{222}Rn, which are released from rocks and soil. Because of their distinctly different source regions, these naturally occurring radionuclides serve as excellent tracers for air masses of (1) upper and lower tropospheric origin and (2) continental origin. The measurement of these natural tracers has provided the global-climate-change modeling community with the most comprehensive and extensive database of its kind in the world, used to test and validate global atmospheric-transport models. As part of this work, EML simulates the global distribution and temporal trends of these radionuclides with its atmospheric transport model (TM2). These simulations are used to identify the physical processes that affect the transport and removal of radionuclides and nonnuclear species that may play roles in aerosol-related climate processes.

Large volumes of air are filtered to concentrate the radionuclides and other energy-related pollutants on filter samples. Surface air is sampled at about 41 stations around the globe from 71° N to 90° S. At most stations, the filters are changed four times a month. Monthly composites of the filters from the SASP stations are measured at EML for their total gamma-ray activities and for ^{7}Be, ^{95}Zr, ^{137}Cs, ^{144}Ce, and ^{210}Pb by high-purity-germanium gamma-ray spectrometry. Weekly samples are also obtained from selected SASP sites and measured for this same suite of radionuclides.

The database is contained in four flat ASCII files.

Access:

All of the monthly-surface-air data have been published in a series of EML reports.

Organization: Department of Energy Library Services

The Department of Energy maintains literally hundreds of libraries at its administrative offices; its national laboratories; its specialized research laboratories; and its research facilities at universities, other federal agencies, and private-sector installations. Many of these libraries have online public-access catalogs (OPACs), participate in DOE information networks like the Integrated Technical Information System (ITIS), and belong to shared-cataloging regional networks like the Ohio College Library Center (OCLC). All of these libraries and the availability of their resources are described in the publication *Resource Directory of DOE Information Organizations.*[3] The major libraries of interest to the GCDIS community are described in this section.

Data System: U.S. Department of Energy Library (Headquarters)

Energy Library (Germantown, MD)
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585
TEL 301-903-4167
FAX 301-903-3960

Energy Library (Forrestal Building, Washington, DC)
1000 Independence Ave., SW
Washington, DC 20585
TEL 202-586-9534
FAX 202-586-0573

These two energy (technical) libraries specialize in energy science and technology, energy resources, environment, business, engineering, and government. Available are books, periodicals, bound volumes, encyclopedias, vertical files, and some microfiche.

Law Library (Forrestal Building, Washington, DC)
1000 Independence Ave., SW
Washington, DC 20585
TEL 202-586-4848
FAX 202-586-0865

The Law Library at DOE specializes in administrative and contract law; energy, legal, nuclear law; procurement; and state and federal codes. Available are books, periodicals, bound volumes, encyclopedias, loose-leaf services, and some microfiche.

ADDITIONAL INFORMATION

Online Catalog: UNIX System (DYNIX) LIBS PLUS 2.1 (GEAC-CLSI) with module (CLCAT) online public-access catalog (OPAC) (but not yet available via Internet)

Interlibrary Loan: ILLs are provided to and received from public, academic, industrial, and government sources mostly via OCLC

Library Access: Generally, open to the public (please call Security at 202-586-6911) Hours are M-F 8:30 AM to 5:00 PM (Law Library is open until 5:30)

Data System: Laboratory Libraries

Argonne National Laboratory Information Services Department

Address:	Technical Information Services Department
	Bldg. 203
	Argonne National Laboratory
	9600 S. Cass Ave.
	Argonne, IL 60439
Phone:	708-252-4275
Fax:	708-252-3609
e-mail:	ywoell@anl.gov
OPAC:	Argonne Information Management (AIM) System; Basis TECHLIB
Internet access:	
Telnet:	aim.tis.anl.gov
WWW:	http://www.tis.anl.gov
Library network:	ILLINET; OCLC
General access:	Library open 9:00 am to 4:30 pm, Monday through Friday; call 24 hr in advance for appointment
Other channels:	NTIS, GPO, Integrated Technical Information System (ITIS)
Description:	The Technical Information Services Department of the Information and Publishing Division promotes the Laboratory's research by providing access to worldwide information resources through ten subject-specific libraries, a reports library, a remote storage facility, and an interlibrary access service.
Holdings:	66,000 books; 1,600 journal subscriptions; and about 1,000,000 technical reports
Services:	Interlibrary loans that carry a $10-per-item standard fee

Brookhaven National Laboratory Information Services Division

Address:	Information Services Division
	Building 477
	Brookhaven National Laboratory
	Box 5000
	Upton, New York 11973-5000
Phone:	516-282-3483
Fax:	516-282-2090
e-mail:	mirvis@bnl.gov
OPAC:	TECHLIBplus
Internet access:	
Telnet:	inform.bnl.gov; login: brookhaven
Gopher:	nform.bnl.gov 8880
WWW:	www.bnl.gov/bnl.html

Library network:	OCLC membership through the Long Island Library Resources Council (LILRC)
General access:	Access by appointment only
Other channels:	NTIS, GPO, Integrated Technical Information System (ITIS),
Description:	Founded in 1947, the Library's collection covers physics, chemistry, mathematics, biology, medicine, environment, energy, instrumentation, nuclear science, and engineering. Special collections include: U.S Department of Energy Contractor Reports, Environmental Research and Development Administrative Reports, Atomic Energy Commission Reports, and European technical reports in nuclear science.
Holdings:	60,000 books, 40,000 bound periodical volumes, 200,000 reports, 6,000 reels of periodical volumes, 522,000 reports on microfiche, and subscriptions to 700 journals and other serials.
Services:	Interlibrary loan; provide access to 20 databases, including Current Contents, BNL Reports, Reprints/Reports from non-BNL sources, Material Safety Data Sheets, Reactor Manuals Database, Facility Documents databases, etc.

Hanford Technical Library

Address:	Hanford technical Library Pacific Northwest Laboratory P.O. Box 999, P8-55 Richland, Wa 99352
Phone:	509-376-1606
Fax:	509-376-1422
e-mail:	pnl_techlib@pnl.gov
OPAC:	Ameritech Horizon (previously called Dynix Marquis)
Internet access:	
Gopher:	gopher1.pnl.gov
Library network:	Western Library Network (WLN), OCLC
General access:	The main library is open from 7:30 to 5:00 Monday through Friday for staff and for vistors. The information desk is staffed from 8:00 to 5:00 Monday through Friday.
Other channels:	PNL documents are available through NTIS and OSTI. Holdings of our books and journals are available through WLN.
Description:	The Library is managed by Battelle-Northwest for the U.S. Department of Energy and its local contractors. The library provides access to resources in areas such as energy, engineering, environmental sciences, chemistry, and other basic sciences. In addition, the library has three branch libraries: Life Sciences, Legal, and the DOE Reading Room.
Holdings:	Onsite holdings include 100,000 book and journal volumes, 800,000 technical reports, and subscriptions to more than 950 journal titles.

Services: Information retrieval, literature searching from more than 400 online databases (including DIALOG, STN, TDS Numerica, RLIN, EPIC, NewsNet, DOE ITIS, DOD DROLS, Medline, and ORS), document delivery, bulletins, journal-subscription maintenance, and a journal-table-of-contents service.

Lawrence Berkeley National Laboratory Library

Address: Library
                   Lawrence Berkeley National Laboratory
                   1 Cyclotron Rd., Bldg. 50B-4206
                   Berkeley, CA 94720
Phone: 510-486-6307
Fax: 510-486-6406
e-mail: library@lbl.gov
OPAC: TECHLIBplus
Internet access:
  Telnet: csa1.lbl.gov, username: cat
  WWW: http://www.lbl.gov/ICSD/Library/text/home.html
Library network: Western Regional Information Service Center
General access: Call for appointment for library visits; in-library use of resources allowed; no external circulation.
Other channels: NTIS, GPO, Integrated Technical Information System (ITIS),
Description: The Library was formally established in October 1946 as a component of the University of California Radiation Laboratory. It presently consists of (1) the Main Library (mathematics, physics, chemistry, earth sciences, computer science, and the general reference collection); (2) the Energy and Engineering Branch (nonnuclear energy and engineering materials, manufacturers' catalogs, telephone directories, and standards); (3) the Materials and Molecular Research Branch (materials science, surfaces, and interfaces); and (4) the Donner Library, located at the Donner Laboratory on the main UC campus (biophysics, radiation biology, and cancer research).
Holdings: The collection includes about 55,000 monographs, 1,500 serials, and 200,000 reports and high-energy physics preprints.
Services: Interlibrary loan

Library, Lawrence Livermore National Laboratory

Address: Library
                   Lawrence Livermore National Laboratory
                   P.O. Box 808, L-610
                   Livermore, CA 94550
Phone: 510-422-4922
Fax: 510-423-6451
e-mail   burton3@llnl.gov

OPAC:	TECHLIBplus
Internet:	
Telnet:	library.llnl.gov; login: patron
WWW:	http://www.llnl.gov
Library network:	None
General access:	None
Other channels:	OSTI, GPO, and NTIS
Description:	The LLNL Library supports the research program of the Laboratory, with an emphasis on computer, biomedical, and environmental sciences as well as chemistry, physics, and engineering.
Holdings:	Holdings include a reference collection of more than 65,000 volumes and 1,500 active serials. Serial holdings are registered in the University of California Melvyl online catalog and the OPAC is accessible from the Internet.
Services:	CD-ROM coverage includes the complete Micropatent database and the IEEE full-text ProQuest system as well as numerous other smaller databases.

Los Alamos National Laboratory Research Library

Address:	Research Library Los Alamos National Laboratory P.O. Box 1663, MS-P362 Los Alamos, NM 87545
Phone:	505-667-5809
Fax:	505-667-4448
e-mail:	library@lanl.gov
OPAC:	GEAC Advance
Internet access:	
Telnet:	library.lanl.gov:9001; login: library
WWW:	http://lib-www.lanl.gov
Library network:	ITIS
General access:	Open to the public 8:00 am to 4:30 pm, Monday through Friday
Other channels:	NTIS, GPO, Integrated Technical Information System (ITIS),
Description:	The Los Alamos National Laboratory Research Library provides information resources to the scientific community at Los Alamos across a wide range of scientific disciplines. The report collection includes an important historical collection in areas of interest to the Laboratory, specifically the development of nuclear weapons.
Holdings:	More than 100,000 monographs; 134,000 bound journal volumes; 2,300 active journal titles; and more than 1,000,000 technical reports
Services:	A full range of library services, including interlibrary loan and access to more than 35 online systems, is offered to clients.

Oak Ridge National Laboratory, Central Research Library

Address: Central Research Library
                  4500-N, MS-6191
                  Oak Ridge National Laboratory
                  P.O. Box 2008
                  Oak Ridge, TN 37831-6209
Phone: 423-574-6744
Fax: 423-574-6745
e-mail: wilsonkt@ornl.gov
OPAC: OASIS; Basis TECHLIBplus
Internet access:
  Telnet: lib1.isd.ornl.gov; login: oasis
Library network: OCLC through Solinet
General access: Inquire about library priviledges by letter or by calling Peggy Tinnel at 423-574-7851.
Other channels: NTIS, GPO, Integrated Technical Information System (ITIS),
Description: The Central Research Library and nine branch libraries support the Laboratory's scientific efforts through its broad scope of scientific and technical materials and information services. It also relies on other libraries in the system for specialized subject information and services. Computerized information retrieval and specialized reference service are provided.
Holdings: 91,000 books; 2,400 journal subscriptions; 100,000 cataloged reports; 2,000,000 uncataloged reports
Services: Interlibrary loan

SRS Technical Library

Address: Westinghouse Savannah River Co.
                  773-A, Library
                  Aiken, SC 29808
Phone: 803-725-2940
FAX: 803-725-1169
e-mail   judy.leblanc@srs.gov
OPAC: TECHLIBplus
Internet access:
  WWW: http://www.srs.gov/search/kidofwais/technical-library
Library network: OCLC; Central Savannah River Area Library Association
General access: Yes
Other Channels: NTIS, OCLC (selective lending), OSTI
Description: The SRS Technical Library is a part of Westinghouse Savannah River Co., the DOE contractor responsible for the operation of the Savannah River Site in Aiken, S.C. The Library is staffed 8:00 to 4:30 Monday through Friday and serves the general public as well as all personnel onsite. The SRS Library's

collection emphasizes nuclear physics in support of the site's heavy-water reactors, nuclear chemistry, and mathematics. Library is open to the public, but visitors must be escorted in the Library because it is in a secure area.

Holdings:	60,000 books and more than 500 journal titles
Services:	Reference; literature searching of business, scientific, and technical literatures; book and subscription acquisition for the site; and interlibrary loan via OCLC. Requests are accepted via e-mail, fax, and phone or in person.

References

[1] *U.S. Global Change Data and Information System Implementation Plan*, approved by CENR, to be published 1994.

[2] National Research Council, *1993 Data Forum, A Review of an Implementation Plan for U.S. Global Change Data and Information*, National Academy Press, Washington, D.C., 1994.

[3] I. D. Bailey and D. M. Henline, *Resource Directory of DOE Information Organizations*, DOE/OSTI-4616-Rev.4, U.S. Department of Energy, Office of Technical Information, Oak Ridge, Tenn., January 1991.

Appendix A. Service-Node Levels of Access

Function	Level 1	Level 2	Level 3	Level 4
Connectivity	Data transfers to 1 megabit/sec	Data transfers to 1 megabit/sec	Voice-grade telephone line	Regular Mail
Search	Catalog system online with gcd/i* from all agencies described in accordance with GCDIS standards	Directory-level information and agency gcd/i documentation online to GCDIS standards	Priority gcd/i information to GCDIS standards and gcd/i documentation by hard copy to GCDIS standards	Existing directory-level gcd/i and hard-copy documentation available to GCDIS
Browse	Online product generation	Online static browse products	Offline digital browse products	Hard-copy browse products
Order	Online GCDIS integrated	Online with manual forwarding	Manual interface	Manual interface
Delivery	User choice, on- or offline via standard formats	User choice, on- or offline via standard formats	User choice of standard formats	User choice of standard formats

DEPARTMENT OF THE INTERIOR

GLOBAL CHANGE DATA AND INFORMATION SYSTEM
IMPLEMENTATION PLAN

SEPTEMBER 30, 1995

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1.0 EXECUTIVE SUMMARY

The Department of the Interior (DOI) Global Change Research Program (GCRP) emphasizes the natural history of global environmental change and interactions of global environmental systems, such as climate, with terrestrial systems and species. The DOI conducts global change research in the U.S. Geological Survey (USGS), National Biological Service (NBS), U.S. Bureau of Mines, U.S. Bureau of Reclamation, and Bureau of Indian Affairs. This research program responds in part to concerns of resource managers about how natural and cultural resources are affected by environmental change, whether it is caused by natural variation or human activities.

DOI bureaus collect, maintain, analyze, and interpret short- and long-term land, water, air, biological, geological, and other natural resource data and information in support of the DOI GCRP as well as other mission responsibilities. These efforts have always included maintenance of high-quality, long-term data sets, including cartographic, land cover, geologic, hydrologic, ecological, and biological data from both satellite- and aircraft-based remote sensing and ground-based observations. DOI is committed to making these data available to all users, including the global change research community, through appropriate mechanisms.

DOI has three nodes for access to focused global change data and information: the USGS Global Change Research Program Data Server, the USGS Earth Resources Observation Systems (EROS) Data Center, and NBS Global Change Research Program Data Management Program node.

Nodes for access to data that contribute to global change research--but not funded by the U.S. Global Change Research Program (USGCRP)--are the various data centers and data systems that archive, process, and distribute the many types of geospatial data that are maintained by DOI bureaus to meet a wide variety of missions. These centers and systems make their data and information available through a variety of mechanisms, ranging from on-line interactive computer-based systems to systems that are manually maintained and provide personal customer service support. All DOI bureaus are implementing the Executive Order 12906: "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure (NSDI)." Bureaus are developing their components of the National Geospatial Data Clearinghouse, a distributed, electronically connected network of geospatial data producers, managers, and users. The Clearinghouse will allow users to determine what geospatial data exist, find the data they need and evaluate its usefulness, and obtain or order the data as economically as possible.

In addition, the NBS is leading the development of the National Biological Information Infrastructure (NBII) which will parallel and complement the NSDI and provide a distributed clearinghouse of biological data and information sources and providers.

2.0 PURPOSE AND SCOPE

This plan identifies and describes DOI contributions to the interagency Global Change Data and Information System (GCDIS). It summarizes the DOI approach to data and information management, the user advisory processes that guide the DOI data management activities, the budget for these data management activities, and the schedule for implementation. The plan also includes overviews of the DOI nodes for focused and contributing/other data. These overviews include a description of each node, its data content, access mechanisms, standards, user services, and implementation schedule.

3.0 DOI OVERVIEW

As the major Federal land manager and primary Federal agency responsible for managing much of the Nation's natural ecosystems, fish and wildlife, and mineral, energy and water resources, the DOI is particularly concerned about the potential short- and long-term effects of climate and other environmental change on these lands and resources. The results of DOI global change research will provide land and resource managers with information on the effects of global change on sensitive environments and resources, thus aiding decision-making on a variety of environmental issues, including the availability of water resources, productivity and health of ecological systems, and biological diversity. DOI global change research provides a sound technical basis to prepare DOI for managing terrestrial ecosystems and resources under uncertain climate conditions.

DOI Global Change Research Program (GCRP) emphasizes the natural history of global environmental change and interactions of global environmental systems, such as climate, with terrestrial systems and species. Research areas include:

> Evaluating the role of natural landscape, water, ecosystems, and geological processes in adjusting the greenhouse gas and aerosol composition of the atmosphere.

> Evaluating responses of terrestrial ecosystems; ecological processes; hydrologic systems and water resources; and physical environmental systems to past, current, and potential future variations or change in climate conditions

> Developing and testing of computer models that simulate the role of landscape, water, and ecological processes in regulating climate and the responses of land, water, and life to climate variability and change.

DOI global change research programs include: studies of past climates from which understanding of current changes can be drawn; interaction and sensitivity of hydrological and ecological systems with climate at local, landscape, and regional levels; arid, polar, and coastal regions and systems; volcano-atmosphere interactions; changing land surface characteristics; assessments of the impacts of global change and the social, environmental, and economic consequences on human activities, water resources, coastal wetlands, biological species, ecological systems, and land management; carbon cycle variation; and archiving, accessing, and distribution of space- and land-based data.

DOI bureaus collect, maintain, analyze, and interpret short- and long-term land, water, air, biological, geological, and other natural resource data and information in support of their missions. These efforts have always included maintenance of high-quality, long-term data sets, including cartographic, land cover, geologic, hydrologic, ecological, and biological data from both satellite- and aircraft-based remote sensing and ground-based observations. DOI is committed to making these data available to global change research community through appropriate mechanisms.

4.0 DOI DATA AND INFORMATION MANAGEMENT

4.1 Management Structure

Capabilities for producing, archiving, managing, accessing, and distributing data and information are distributed throughout DOI bureaus. Resources to support some of these activities are provided by the DOI GCRP. However, the majority of DOI data are collected, maintained, and distributed in response to missions that are not directly related to the USGCRP. There is no centralized data management infrastructure within DOI, and no such infrastructure is being developed to support the GCDIS. Rather, management is administered through a few data centers that manage and distribute large data sets (such as the USGS EROS Data Center), and a variety of smaller facilities that maintain data on a much more modest scale.

DOI currently has three nodes for focused global change data and information management: the USGS GCRP Data Server, the USGS EROS Data Center, and the NBS GCRP Data Management Program node.

4.2 Responding to the User Community

User Interaction

Focused DOI global change data management efforts respond primarily to the DOI GCRP and other constituents to whom the data are relevant. Other data management programs respond to the constituents for whom the programs were established. Due to the mission and operating approach of such programs, global change users may have limited opportunity to influence the functioning and priorities of these programs.

Building on traditional methods of user support such as telephone, fax, and walk-in, DOI is actively using Internet-based information technologies such as gopher, World Wide Web (WWW), and Wide-Area Information Servers (WAIS) to make metadata available. In addition, many data sets can also be downloaded via the Internet at no additional cost from the USGS GCRP Data Server, the EROS Data Center's Global Land Information System (GLIS), and (as an example of a contributing data set) the Fish and Wildlife Service National Wetlands Inventory data server.

DOI is using a variety of approaches to publicizing the availability of its global change data and information products, including exhibits and demonstrations at professional society

meetings and technical meetings of agencies and interested organizations; preparation of brochures and fliers describing our products and services and how to access them; sharing information about our products and services through Internet newsgroups and other resources; and through various electronic access means such as DOI WWW home pages.

Executive Order 12906 gives the Federal Geographic Data Committee (FGDC) the responsibility to coordinate the Federal Government's development of the National Spatial Data Infrastructure (NSDI). The FGDC is directed to involve State, local, and tribal governments in the development and implementation of initiatives in the Order. The FGDC must also utilize the expertise of academia, the private sector, professional societies, and others as necessary in these activities. Interaction with these diverse user groups will guide DOI activities that provide access to contributing/other data that are of interest to global change research.

User Advisory Process

Many advisory groups review and provide guidance on specific DOI global change program elements, including their data management components. These groups serve specific agency programs and their activities are not generally coordinated at a higher level in DOI.

USGS advisory groups:
- USGS Global Change Peer Review Panel: reviews the USGS GCRP, including data management activities
- Mapping Science Committee of the National Research Council: advises the USGS on its cartographic, geographic, and spatial data activities, including global change data management
- Several discipline-specific groups advise individual programs at the USGS EROS Data Center (more information about these groups is given in section 7.6):
  -- International Geosphere-Biosphere Program Data and Information System (IGBP-DIS)
  -- Earth Observing System (EOS) Science Advisory Panel
  -- United Nations Environment Programme (UNEP) Global Resource Information Database (GRID)-Sioux Falls Advisory Panel
  -- Advanced Very High Resolution Radiometer (AVHRR) Pathfinder Land Science Working Group
  -- North American Land Characterization (NALC) Advisory Group

NBS advisory group:
- NBS Global Change Program Committee: advises the NBS GCRP and selects the NBS GCRP Peer Review Panel

The FGDC has formed partnerships and is actively cooperating with a diverse group representing State and local government, professional societies, the National Academy of Sciences and other academic institutions, non-governmental organizations, and private industry. The primary advisory groups are identified in section 9.6. Through its involvement in the FGDC, DOI is working with these groups to implement the various elements of the NSDI.

4.3 Budget

Budget for Focused DOI Global Change Data Management

The funding profiles of the USGS and NBS focused global change data management activities are as follows:

	Millions of $ by Fiscal Year					
	1991	1992	1993	1994	1995	1996
USGS Global Change Research Program Data Server		0.1	0.1	0.1	0.1	0.1
USGS Land Data Management Program	5.1	5.5	4.3	4.3	4.3	4.3
NBS Global Change Data Management						0.5

Funds for DOI global change data management activities are also associated with each of the various research projects of the DOI GCRP. However, specific funding levels for each of these activities have not been tabulated.

Budget for Contributing/Other DOI Data Management

The most comprehensive summary of DOI expenditures for data management related to contributing/other data management activities was prepared in response to OMB Bulletin No. 93-14, Achieving Improved Coordination and Efficiency in Geographic Data Management. All Federal agencies were asked to provide information for Fiscal Years 1992-1994 on their expenditures to collect and manage geographically referenced data. While there is not a direct correlation between the activities for which DOI bureaus responded in this OMB request and the scope of DOI data that would be considered as "contributing" or "other" in the USGCRP context, these data (summarized in Table 1) provide a useful approximation of the order of magnitude of spending in DOI to manage spatially referenced data.

For this exercise, OMB requested information on geographic data, which was defined as any data referenced to a location on the surface of the Earth. Examples include: observations referenced to a specific location by coordinates or other descriptor (e.g., water quality measurements, forest inventory plots, soil sampling); vector delineations of geographic features (e.g., wetland maps, digital cartographic data files); raster images (e.g., Landsat data, digital orthophotoquadrangles), and statistical data referenced to a specific geographic area (e.g., census counts, timber inventories). Agencies were also asked to include expenditures on aerial photography, remotely sensed data and imagery, nautical charts, operation of remote sensing and positioning systems, and processing of images to make maps and orthoimagery. The expenditures that were reported under data management include data digitization and automation, data integration and preparation, data maintenance and updates, and data dissemination.

Table 1. Federal agency expenditures to collect and manage geographically referenced data.

DOI Bureau/Office[1]	Millions of $ by Fiscal Year		
	1992 Actual	1993 Enacted	1994 Budget
Bureau of Indian Affairs	0.50	0.74	0.81
Bureau of Land Management	24.97	25.67	29.62
Bureau of Mines	0.32	0.28	0.58
Bureau of Reclamation	4.43	5.70	6.74
Fish and Wildlife Service	11.16	13.17	16.54
U.S. Geological Survey	169.00	163.80	198.00
Minerals Management Service	5.07	5.36	9.29
National Park Service	8.37	11.18	14.65
Office of Surface Mining	0.41	0.90	0.64
Office of the Secretary	0.55	0.14	0.08
TOTAL	224.78	226.94	276.95

[1] Note: The National Biological Service did not exist when this survey was made; most programs that are now part of the NBS were included in expenditures of other bureaus.

Schedule

For DOI global change data management nodes, the schedule for providing DOI GCDIS data and information access capabilities is presented under each node description. Other individual DOI data management activities that contribute to GCDIS will provide a variety of capabilities on various time scales.

Most of the DOI activities dealing with managing contributing/other data are being conducted in response to the implementation of the NSDI; therefore, DOI bureaus are working against the general schedule and milestones defined by Executive Order 12906 (Section 9.7).

5.0 SYSTEM OVERVIEW

5.1 DOI Nodes for Focused Global Change Data

DOI currently has three nodes for focused global change data and information management:
    USGS GCRP Data Server (Section 6.0)
    USGS EROS Data Center (Section 7.0)
    NBS GCRP Data Management Program node (Section 8.0)

5.2 DOI Nodes for Contributing/Other Data

Nodes (or equivalent) for contributing/other data are the various data centers and data systems that archive, process, and distribute the many types of geospatial data that are maintained by the various DOI bureaus to meet a wide variety of missions. A summary of these capabilities appears in section 9.0.

6.0 USGS GLOBAL CHANGE RESEARCH PROGRAM DATA SERVER

6.1 Description

The USGS Global Change Research Program Data Server, located in Reston, Virginia, provides network access to data and information from the USGS Global Change Research Program. Services include online access to program documentation, research project descriptions, and digital data products (comprising both digital versions of USGS reports and documented, citable data sets) through anonymous ftp and the WWW.

6.2 Content

The system provides access to data sets on the following subjects:
Global characteristics of the modern world's oceans
Pliocene Research, Interpretation, and Synoptic Mapping (PRISM) project
Paleoclimate studies of the Arctic Ocean
Owens Lake (California) climate record
Methane and gas hydrates in Arctic sediments and permafrost
Volcano emissions
Climates of arid and semiarid regions
Software tools for analysis and management of data and information

6.3 Access

Online access is provided through the Internet (ftp and http) to a Data General AViiON 6220 file server (geochange.er.usgs.gov). Some data products are available in CD-ROM format through USGS Earth Science Information Centers. The system administrator responds to reasonable requests for distribution in other media.

6.4 Interfaces

Anonymous ftp to: geochange.er.usgs.gov (130.11.54.209)
Using a WWW browser, open the Universal Record Locator (URL):
http://geochange.er.usgs.gov/

6.5 Standards

Data are stored in formats compatible with three common computing systems: Macintosh, MS-DOS, and UNIX. Standard file formats used include HDF, tab-delimited ASCII, PostScript, GIF, PICT, and TIFF. Where nonstandard formats are used, the file formats are explicitly documented in text and by providing programs in source and executable forms to encode and decode the data. Programs are provided in source and executable code wherever possible, using Standard C and Fortran-77.

6.6 User Advice and Services

The system administrator answers phone and email inquiries, and uses system logs to document user problems with system access. The system administrator can be reached at:

> USGS Global Change Research Program Data Server
> c/o Peter Schweitzer
> U.S. Geological Survey
> 955 National Center
> Reston, VA 22092-0001
> Telephone: 703-648-6533   Fax: 703-648-6647
> E-mail: peter@limulus.er.usgs.gov

6.7 Implementation Schedule

The system became fully operational in October 1993. Likely future improvements include consolidation of existing data sets on thematic CD-ROM's and enhancement of the underlying network support (e.g., use of URNs over URLs). The schedule for achieving GCDIS access levels is as follows:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	2	2	2
Browse	1	1	1
Order	2	2	2
Delivery	2	2	2

(see Appendix B for summary of levels of implementation)

7.0 USGS EARTH RESOURCES OBSERVATION SYSTEMS (EROS) DATA CENTER

7.1 Description

The USGS Earth Resources Observation Systems (EROS) Data Center, located in Sioux Falls, South Dakota, is a data management, systems development, and research field center. It was established in the early 1970's to receive, process, and distribute data from the National Aeronautics and Space Administration (NASA) experimental Earth Resources Technology Satellite-1 (now known as Landsat-1), and to conduct remote sensing research and technology transfer activities. Its central U.S. location provides the capability to receive real-time digital data of most of the North American continent from landsat and other Earth-orbiting satellites. With the enactment of the Land Remote Sensing Policy Act of 1992, the Center was designated as the National Satellite Land Remote Sensing Data Archive. This designation has broadened the Center's responsibility for preserving and providing long-term access to satellite-acquired remotely sensed data of the Earth's land areas.

The EROS Data Center and its staff of over 300 scientists, engineers, and technicians carry out a broad range of activities in the management of global Earth observations data, including the development and operation of advanced systems for receiving, processing, distributing, and applying land related earth science, mapping, and other geographic data and information. These data support scientific studies, resource management, and environmental monitoring activities world-wide. The Center is a major supplier of analytical and other support services to Federal agencies involved in the use of this data and information. The facility operates one of the DOI's largest computer complexes to provide these services. Over 100 locations in Federal, State, and commercial offices are linked to the Center's computers for data inquiries. More than 60,000 inquiries and orders are received annually, resulting in the distribution of over 250,000 products to scientists and resource managers around the world.

EOSDIS Land Processes Distributed Active Archive Center: Through agreements between NASA and the USGS, the EROS Data Center will play a major role in the archiving, processing and distribution of EOS land-related data. The EROS Data Center is the NASA EOS Data and Information System (EOSDIS) Land Processes Distributed Active Archive Center (LPDAAC) for archiving and distributing land data from the Moderate Resolution Imaging Spectrometer (MODIS) and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER). To carry out this responsibility, several EOSDIS planning and systems engineering activities are underway: supporting NASA development of data processing, archiving and information management systems; definition of specifications and production procedures for standard and derivative products; coordination of data system requirements for the critical land remote sensing instruments; integration of EOS and non-EOS data systems and related archives and products; coordination of interfaces between the LPDAAC and the other elements of the EOSDIS network and expansion of existing EROS Data Center facilities to house the LPDAAC. Additional information about the EOSDIS program can be found in the NASA GCDIS Implementation Plan.

As part of the EOSDIS program, the EROS Data Center is: beginning implementation of Version 0 data archiving, processing, and distributing capabilities with existing precursor (non-EOS) data sets, including AVHRR, Landsat, Airborne Visible Infrared Imaging Spectrometer (AVIRIS), and Thermal Infrared Multispectral Scanner (TIMS); making non-EOS land data sets (such as global topographic data sets) available to the EOS science community; participating with the EOS science and instrument teams to ensure delivery of land-related products required for EOS investigations; establishing a science advisory group to guide science requirements and evaluate EOS data products; and beginning to link the USGS Global Land Information System (GLIS) to the EOSDIS Version 0 Information Management System.

UNEP GRID Node: The EROS Data Center also serves as the North American node of the United Nations Environment Programme (UNEP) Global Resource Information Database (GRID), which is an international network for distributing environmental data and related research findings. In 1991, UNEP, NASA, and the USGS agreed to establish and operate a North American UNEP/GRID facility at the EROS Data Center. The facility serves a function similar to that of GRID-Nairobi, GRID-Geneva, and GRID-Bangkok, which is to: (1) collate, store, retrieve, analyze, and distribute environmental data sets; (2) provide support to environment-related projects requiring geographic information system and image processing technologies; and (3) support training in such technologies, particularly for experts and institutions in developing countries. The network of GRID facilities in Africa, Asia, Europe, and North America has been established to provide the world community with access to timely, usable environmental data and to the necessary data processing and telecommunication technology to make best use of such data for global science applications. GRID-Sioux Falls has worked with remotely sensed data to support UNEP's environmental assessment efforts in the Persian Gulf region following the Gulf War.

The EROS Data Center is also the World Data Center-A for Remotely Sensed Land Data.

International Linkages: EROS Data Center staff participate in several international coordination efforts that have data management components: (1) the Committee on Earth Observation Satellites (CEOS), an international group whose members include NASA, the National Oceanic and Atmospheric Administration (NOAA), the European Space Agency, Canada, and Japan; (2) the Landsat Ground Station Operators Working Group; and (3) the Land Cover Change Pilot Study of the International Geosphere-Biosphere Program (IGBP) Working Group on Data and Information Systems (other participating countries include Canada, France, Russia, Australia, and the European Economic Community).

7.2 Content

The EROS Data Center archives contain space- and aircraft-acquired data and imagery of the Earth, including over 2 million images acquired from Landsat and other satellites and over 8 million aerial photographs; and a variety of regional, continental, and global land data sets such as vegetation, land cover, terrain, and soils. A list of available data sets is provided in Table 1. The Center is also a central clearinghouse for information concerning the holdings of foreign Landsat ground receiving stations and data acquired by Earth-observing satellites operated by other countries.

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Table 1. Data sets available through the USGS Global Land Information System

Data Set Description	Agency Source	Distribution Site
SATELLITE AND SATELLITE-DERIVED DATA		
Landsat MSS	NOAA	USGS/EDC
Landsat TM (more than 10 years old)	NOAA	USGS/EDC
Landsat TM (less than 10 years old)	NOAA	EOSAT
Landsat MSS and TM Data From Non-U.S. Ground Stations	Several Stations	Several Stations
Advanced Very High Resolution Radiometer (AVHRR)	NOAA	NOAA/NESDIS, USGS/EDC
AVHRR Composites (Conterminous U.S., Alaska, Africa)	USGS	USGS/EDC
Global Experimental AVHRR Composites	NOAA	USGS/EDC, NOAA
Skylab, Gemini, Apollo	NASA	USGS/NMD
Space Shuttle	NASA	USGS/NMD
SPOT	SPOT Image Corp.	SPOT Image Corp.
RADAR DATA		
Side-Looking Airborne Radar	USGS	USGS/NMD
DIGITAL TOPOGRAPHIC DATA		
7.5' DEM Data Set (U.S.)	USGS	USGS/EDC
1-degree DEM Data Set (U.S.)	USGS	USGS/EDC
30 Arc-Second DEM Data Set	NOAA/NGDC	NOAA/NGDC
Earth Topography--5 Minute Grid	NOAA/NGDC	NOAA/NGDC
DEM Data Derived from Digital Chart of the World	USGS	USGS/EDC
CARTOGRAPHIC DATA		
Digital Line Graphs (1:100,000-Scale)	USGS	USGS/NMD
Digital Line Graphs (1:2,000,000-Scale)	USGS	USGS/EDC
Digital Chart of the World	DOD/DMA	USGS/EDC, NMD
Digital Line Graphs (1:24,000 scale)	USGS	USGS/NMD
Digital Orthophoto Quadrangles	USGS	USGS/NMD
LAND USE/LAND COVER DATA		
Land Characteristics	USGS	USGS/EDC
Matthew's Global Vegetation Data Set	NOAA/NCAR	NOAA/NCAR
Major Land Resource Areas	USDA/NRCS	USDA/NRCS, USGS/EDC
North American Landscape Characterization	EPA/USGS	USGS/EDC
Western Oregon Digital Data Base	BLM	BLM
Major World Ecosystems	DOE/CDIAC	DOE/CDIAC
Omernik Ecoregions Data Set	EPA	USGS/EDC
HYDROLOGIC DATA		
Hydrologic Unit Maps (1:2,000,000-Scale)	USGS	USGS/EDC
Global Hydrologic Data Set	Trent Univ. Ontario, Canada USGS	Trent Univ. Ontario, Canada USGS/EDC
EARTH SCIENCE DATA		
Geophysical Data	USGS	USGS/EDC
National Uranium Resource Evaluation (NURE)	USGS	USGS/EDC
Zobler World Soils Data Set	NASA/GISS	NASA/GISS

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<u>Landsat Data Conversion and Product Generation</u>: By the launch of the first EOS polar platform in 1998, Landsat data will provide a 25-year baseline of information about land surface conditions and changes during the 1970's, 1980's, and 1990's that is not available from any other data source. As the operator of the National Satellite Land Remote Sensing Data Archive, the USGS archives Landsat Multispectral Scanner (MSS) and Thematic Mapper (TM) data acquired by the U.S. (approximately 800,000 scenes). The USGS has embarked on a major program to convert this Landsat data archive from aging magnetic media to next-generation digital cassette tapes because approximately half of these data are more than 10 years old and are stored on deteriorating magnetic tape. Conversion of post-1978 MSS data began in December 1992 when a new conversion system began operating; this task was completed in July 1994. TM data conversion began in November 1993; over 50 percent of the TM data acquired prior to the signing of the Land Remote Sensing Policy Act of 1992 had been converted by March 1, 1995. Approximately 300,000 scenes of pre-1979 MSS data are stored on a Wide-Band Video Tape (WBVT) medium that is deteriorating. Conversion of these data will require development of specialized hardware and software, but funding is not yet available for its procurement.

The National Landsat Archive Production System is currently under development. It will replace the EROS Data Center's obsolete Landsat MSS processing systems and add the capability to produce Landsat TM products. When installed in FY 1996, it will provide fully corrected products from Landsat 1-5 data. This is essential because the Earth Observation Satellite Company (EOSAT), the commercial Landsat operator, has removed the data use restrictions from all Landsat MSS data and from portions of the TM archive, and these data are now available to all users at the cost of filling user requests. An improved Landsat processing capability is needed to meet the anticipated growth in demand for these products.

<u>Global 1-km AVHRR Data Acquisition</u>: Other types of satellite data are being added to the EROS Data Center archives. Since 1992, the USGS has been working with NASA, NOAA, the European Space Agency, and more than 20 foreign ground receiving stations to collect 1-km resolution AVHRR data for each daily pass over the Earth's land surface. These data support many applications, including efforts to produce a global land cover map and to monitor vegetation condition (greenness) on a periodic basis throughout the year. This program is being coordinated with the International Geosphere-Biosphere Program and CEOS. It complements the operational NOAA programs that collect global AVHRR data at 4- and 16-km resolution, primarily for oceanic and atmospheric applications.

7.3 Access

<u>Global Land Information System (GLIS)</u>: GLIS is the primary USGS tool to provide users with information about and access to global land data sets. The system references a variety of regional, continental, and global land data sets (see Table 1 for list of accessible data sets), provides query features to assist in determining potential utility and availability of data sets, and supports on-line requests for related data products. Both textual and graphical user interfaces are accessible by either wide-area network or dial-up communication.

GLIS became operational in June 1991 with information access functionality for directory-, guide-, and inventory-level retrieval and presentation. Access methods now include both

personal computer and workstation versions using modem and Internet communications. GLIS enhancements over the next 3 years will focus on WWW access and data set population; some enhancements will extend spatial query to allow simultaneous multi-inventory search and manipulation of results. Graphical user interfaces are available through both PC-GLIS and the X-Windows release of XGLIS. Additional data sets and expanded browse image capability are being added continually. Users can specify geographic search parameters interactively on a map with a mouse, and view geographic coverage plots and digital image browse capabilities using on-screen user query features.

There are several GLIS access mechanisms:

From the Internet:
    Through the GLIS WWW home page: http://edcwww.cr.usgs.gov/glis/glis.html
    X-Windows graphics interface: telnet 152.61.192.37 (or telnet xglis.cr.usgs.gov)
    X-Windows graphics local client: download client software from server at
        Internet address: edcftp.cr.usgs.gov
        Change directory to: /pub/software/xglis
    Text-only terminal interface: telnet 152.61.128.7
                                    (or telnet glis.cr.usgs.gov)

From a dial-up modem:
    Text-only terminal interface: set modem to 8 bits, no parity, 1 stop bit;
        dial: 605-594-6888
    PC-GLIS with graphics interface: download PC-GLIS software from server at
        Internet address: edcftp.cr.usgs.gov
        Change directory to: /pub/software/pcglis

Data set information in GLIS is maintained in three levels of detail--directory, guide, and inventory. The directory level contains summary descriptions of entire data sets. Data directory textual searches are based on discipline, project, sensor key words, geographic location, and other parameters. The guide level contains detailed descriptions of data sets, including information about sensor specifications, extent of coverage, processing history, data quality, and product availability. The inventory level contains detailed information about individual data elements (granules), such as the time and location of a Landsat scene or AVHRR pass. Spatial queries can be made by specifying points, rectangles, polygons, or geographic names. GLIS also provides features for graphical presentation of user-specified geographic search areas, geographic coverage of available data, and browse images.

7.4 Interfaces

GLIS provides automated Level 1 order passing to seven non-USGS data centers, including context passing which describes the user and specific product(s) being requested from that center:

    NASA Climate Data Center
    NOAA National Geophysical Data Center

Bureau of Land Management
EPA Oak Ridge National Laboratory
National Center for Atmospheric Research
Earth Observation Satellite Company
Trent University, Ontario, Canada

GLIS has automated linkages for Level 2 passing of users to many other online systems, including:

NASA EOSDIS Information Management System
NASA Pilot Land Data System
NASA Space Shuttle Observation Project Photographic Data Base
NOAA Earth System Data Directory
NOAA Satellite Active Archive
NTIS FedWorld online system
USGS Water Resources Division
Global Change Master Directory
CIESIN Global Change Information Gateway through Gopher
Upper Mississippi and Missouri River Data (Scientific Assessment and
   Strategy Team)
University of Rhode Island AVHRR Inventory
Canada Centre for Remote Sensing Global Change Network (GCNet)
European Space Agency on-Line Earthnet Data Availability (LEDA)
Japanese National Space Development Agency Earth Observation
   Satellite Data Inventory Service (SINFONIA)
German Intelligent Satellite Data Information System (ISIS)
South Africa Satellite Applications Centre

A WWW server is also operational at the EROS Data Center which provides hypertext access to information about the data holdings at the Center, as well as direct Internet ftp access to online cartographic data sets. The URL for this GeoData access is:
   http://edcwww.cr.usgs.gov/doc/edchome/ndcdb/ndcdb.html

The interface offers a unique digital index map approach that allows the user to point and click at a graphic map to select digital topographic and cartographic files to download over the Internet. Metadata describing these digital data sets is available through the USGS node of the National Geospatial Data Clearinghouse; the Internet address is:
   http://nsdi.usgs.gov/nsdi/

The USGS continues to add data and metadata to this node in support of the NSDI.

7.5 Standards

GLIS uses the following software standards: UNIX operating system; C programming language; Informix and Oracle data base management systems; hypertext markup language for all text applications (help, guide, directory); telnet for Internet access; CURSES for ascii GLIS user interface screens; and in-house software for PCGLIS.

GLIS uses the following hardware standards: GLIS core server: IBM RISC 6000; GLIS data base servers: IBM RISC 6000, Data General 6220/6240/9500; Browse server: EPOCH optical disc mass storage; GLIS Client: Sun SPARC, Data General, and Silicon Graphics workstations.

The EROS Data Center is using the FGDC Content Standard for Digital Geospatial Metadata at the dataset level of description. A gateway and translator are being developed to present inventory-level information in a manner that is consistent with the NSDI Clearinghouse procedures.

7.6 User Advice and Services

User Advice

Scientific advice on the development of large-area data sets such as satellite data and other data sets such as vegetation, land cover, terrain, and soils is provided by particular advisory groups established to advise specific programs, including the following:
- International Geosphere-Biosphere Program Data and Information System (IGBP-DIS): advice on data collection and processing aspects of international programs
- EOS LPDAAC Science Advisory Panel: advises the LPDAAC on project activities related to EOS data sets, sensors, and information systems requirements
- UNEP GRID-Sioux Falls Advisory Panel: advises the UNEP/GRID node at the EROS Data Center on GRID projects, data set development, and information systems
- AVHRR Pathfinder Land Science Working Group: advice on AVHRR processing
- North American Land Characterization (NALC) Advisory Group: advises the NALC project staff regarding data processing and related issues

User Services

Electronic mail, fax, telephone, mail, and walk-in inquiries about general information, data selection, and ordering assistance are handled by Customer Service Representatives at:
Customer Services
USGS EROS Data Center
Sioux Falls, SD 57198
Telephone: (605) 594-6151   Fax: (605) 594-6589
Internet: custserv@edcserver1.cr.usgs.gov

Information about the EROS Data Center and its EOSDIS activities also can be obtained through these WWW home pages:
EROS Data Center: http://edcwww.cr.usgs.gov/eros-home.html
EOSDIS LPDAAC: http://edcwww.cr.usgs.gov/landdaac/landdaac.html

Several USGS Earth Science Information Centers in the U.S. offer nationwide information and sales service about geologic, hydrologic, topographic, and land use maps, books, and reports; aerial, satellite, and radar images and related products; earth science and map data in digital format and related applications software; and geodetic data. They also provide

information about earth science materials from many public and private producers in the U.S. using automated catalog systems for information retrieval and research services. For further information, contact:

Customer Services
Earth Science Information Center
U.S. Geological Survey
507 National Center
Reston, VA 22092
Telephone: 1-800-USA-MAPS   Fax: (703) 648-5548
Internet: esichelp@usgs.gov

The USGS has a WWW site with information on USGS programs and activities. The URL is:
http://www.usgs.gov/

7.7 Implementation Schedule

Function	1995	1996	1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	1	1	1
Delivery	1	1	1

(see Appendix B for summary of levels of implementation)

8.0 NBS GLOBAL CHANGE RESEARCH PROGRAM DATA MANAGEMENT PROGRAM

8.1 Description

The NBS was established in November 1993 from parts of seven DOI bureaus. The global change research programs of four DOI bureaus were brought together as the NBS Global Change Research Program (GCRP). The NBS GCRP is directed through the NBS Office of Research, in coordination with the Office of Information and Technology Services.

The NBS is leading the development of the National Biological Information Infrastructure (NBII). The NBII functions through a distributed federation of biological data and information sources. This includes data and information from NBS offices and science centers, as well as data and information of other Federal agencies, State agencies, natural history museums, private organizations (such as The Nature Conservancy), and international agencies and organizations.

The NBS portion of GCDIS is operational. NBS GCRP data are described through a NBS Global Change WWW home page on the NBII. The NBII also provides hot links directly to GCDIS and the Global Change Master Directory WWW servers.

8.2 Content

The bulk of the NBS GCRP data resides at distributed sites, universities, and science centers. These data were collected for specific focused projects and are managed on a project-by-project basis. Databases currently available through the NBII include Climate and Subalpine Tree Growth in the Cascade and Olympic Mountains, Climate and Crater Lake Functions, and Breeding Birds Survey. Other databases to be made available span a variety of disciplines, such as species studies, paleoecology, geomorphology, riparian ecology, palynology, and dendrochronology.

8.3 Access

High-level documentation of NBS global change data is provided to the NBS GCRP Data Management Directory which is maintained on a WAIS server. It is the NBS component of the GCDIS gopher server.

The NBS GCRP maintains a NBS Research--Global Change Data Management WAIS server (address: 164.159.126.3) with metadata about global change data bases in subject areas such as ecology, watershed, nutrient cycling, paleoclimatology, and vegetation. Plans are to increase the number of data bases described on the server. The server is accessible on the GCDIS gopher.

8.4 Interfaces
        Anonymous ftp: FTP.its.nbs.gov
        WWW (NBII):   http://www.nbs.gov/nbii/

8.5 Standards

The FGDC Content Standard for Digital Geospatial Metadata is used for geospatial data. The proposed NBII Metadata Content Standard for non-geospatial biological resource data (based on the FGDC Content Standard for Digital Geospatial Metadata and on USMARC) is under development.

8.6 User Advice and Services

User assistance is provided by the NBII Coordinator:
   NBII Coordinator
   National Biological Service
   MS 3070 - MIB
   1849 C Street NW
   Washington, DC 20240
   Telephone: 202-482-4545   Fax: 202-273-0825
   Internet: Anne_Frondorf@nbs.gov

The NBS Global Change Program Committee advises the NBS GCRP and selects the NBS GCRP Peer Review Panel; it is not currently active but will be resurrected.

8.7 Implementation Schedule

Function	1995	1996	1997
Connectivity	1	1	1
Search	2	2	2
Browse	4	3	2
Order	4	4	3
Delivery	2	2	2

(see Appendix B for summary of levels of implementation)

9.0 DOI PARTICIPATION IN THE NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI)

9.1 Description

The Office of Management and Budget (OMB) Circular No. A-16 ("Coordination of Surveying, Mapping, and Related Spatial Data Activities") established the Federal Geographic Data Committee (FGDC) in 1990 to promote the coordinated development, use, sharing, and dissemination of geographic data. It is chaired by the Secretary of the Interior. OMB identified the need for a "national digital spatial information resource", which has come to be called the National Spatial Data Infrastructure (NSDI). The NSDI, is a framework within which organizations and technology interact to foster more efficient use, management, and production of geospatial data. Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: the National Spatial Data Infrastructure," gives the FGDC the responsibility to coordinate the Federal Government's development of the NSDI. Development of the DOI component of the NSDI is coordinated through the Interior Geographic Data Committee.

The NSDI is primarily an umbrella of policies, standards, agreements, and partnerships among a variety of sectors and disciplines that will promote more cost-efficient production, ready availability, and greater use of higher quality geospatial data. The major objectives of the NSDI are to foster enhanced use of geospatial data through better management of existing geospatial data and through more efficient collection and production of new geospatial data in ways that maximize data usefulness for multiple data users. The NSDI promotes development and maintenance of, and access to, data sets that are needed for national, regional, State, and local analyses. Many of these data sets, which are developed by agencies to meet ongoing mission responsibilities, are also useful for global change research. The efforts of the FGDC will improve access to these data sets by global change researchers as well as a wide range of other users.

9.2 Content

The scope of data types that are included in the NSDI is quite broad. Executive Order 12906 defines "geospatial data" as information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. The definition includes geographically referenced economic, demographic, and environmental data. Statistical data may be included in this definition at the discretion of the collecting agency.

A "Manual of Federal Geographic Data Products" was published in hard-copy form (FGDC, 1993) to provide an initial reference source to the types of spatial data that will become available through the Clearinghouse (see 9.3 Access). It contains a comprehensive descriptions of over 150 publicly distributed Federal geographic data products from 21 Federal agencies, including maps, digital data, aerial photography and multispectral imagery, and other geographically-referenced data sets. An electronic version is being developed.

9.3 Access

The FGDC is developing the National Geospatial Data Clearinghouse (the "Clearinghouse") to provide a means to document, query, search, and access geospatial data in much the same fashion as is being developed for global change data through GCDIS. The Clearinghouse is a distributed network of geospatial data producers, managers, and users linked electronically. It is based on a distributed approach to geospatial data management that relies on data producers to document their data consistently using the FGDC Content Standard for Digital Geospatial Metadata (the "Metadata Standard"). This standard helps Clearinghouse users determine what data exist, evaluate the fitness of such data for a particular use, provide information to access a data set, and provide information during transfer so that a data set can be processed and used. The FGDC provides workshops on the Metadata Standard and the Clearinghouse to Federal agencies and State and local governments on a continuing basis.

DOI bureaus are establishing their part of the Clearinghouse to make DOI geospatial data available to the public. Descriptions of DOI geospatial data are being prepared using the Metadata Standard. Data searches can be conducted over the Internet, using public-domain WAIS query software by means of a variety of information servers. DOI bureaus are developing internal procedures to ensure that they access the Clearinghouse before they collect or produce new geospatial data, to determine whether the information has already been collected by others, or whether cooperative efforts to obtain the data are possible.

Executive Order 12906 instructed the Secretary of the Interior, through the FGDC, to take steps within 6 months of the date of the order to establish the Clearinghouse and carry out the other requirements of the Order. The following paragraphs summarize progress made by DOI bureaus as part of this effort (status as of August 1995):

Bureau of Indian Affairs. A draft NSDI and metadata implementation plan was prepared. Information describing Executive Order 12906 was presented to the Intertribal Geographic Information System (GIS) Council, and discussions were initiated with tribes regarding the implementation of the Clearinghouse and tribal concerns with data security. A poll of tribes is being made to determine which tribes will permit inclusion of their data in the Clearinghouse. Access to DOINet was implemented and is being used actively.

Bureau of Land Management. Policies were developed for data sharing, exchange, cooperative data collection, and external access to BLM information. BLM State Offices are preparing Spatial Data Transition Plans, which will include documenting current data holdings using the Metadata Standard. The bureau is testing the use of the Internet for the Clearinghouse and the Government Information Locator System (GILS). The results will be used to refine the bureau's Internet policy and to develop technical guidance for implementing the Clearinghouse and GILS.

Bureau of Reclamation. A plan has been developed for implementing FGDC standards, the NSDI, and the Clearinghouse. Metadata will be managed and served to the Internet community by six regional Reclamation Offices. Regions are conducting inventories of data suitable for inclusion in the Clearinghouse.

Fish and Wildlife Service. The Fish and Wildlife Service GIS Steering Committee was charged with developing a plan for implementing Executive Order 12906 and integrating this effort with ecosystem management in the Service. The following servers have been established on the Internet to make FWS data more accessible:

> National Wetlands Inventory (ftp, WAIS, WWW)
> Division of Information Resources Management (WWW, WAIS)
> Division of Refuges (WWW)
> Forensics Laboratory (ftp, WWW)

Servicewide training in the use of the Metadata Standard has occurred, and a draft directive was issued that establishes completion dates for documenting existing digital data files.

Minerals Management Service. A plan has been implemented for compliance with Executive Order 12906. The MMS Mapping and Survey staff in Denver, Colorado, prepared an inventory of existing data holdings and a schedule for documenting them; a server is also being set up.

National Biological Service. An internal NBS NBII Implementation Task Force has been established to focus activities within NBS. An NBS directive was issued that requires documentation and serving of newly collected data (per Executive Order 12906) and development of plans to inventory, prioritize, and document existing NBS databases. Several metadata training workshops have been provided for NBS staff. Each NBS center is being configured to serve metadata; selected centers will serve data as well.

National Park Service. The National Park Service (NPS) submitted a Clearinghouse plan to the Interior Geographic Data Committee and is reactivating the NPS Geographic Data Committee to address data inventories and Clearinghouse implementation. NPS has documented spatial data sets for Pecos National Historical Park, Mammoth Cave National Park, and Indiana Dunes Historical Park. Many other park units and program offices have begun data documentation and are exploring presentation styles. The NPS is establishing WWW, WAIS, and FTP servers with technical support from NBS and North Carolina State University.

U.S. Geological Survey. USGS prepared an implementation Plan for USGS compliance with Executive Order 12906 and initiated inventories of existing data holdings. Metadata documentation is being written for the standard USGS geospatial data products. Several servers have been established to make USGS geospatial data and metadata available to users. Public access to data is provided: (a) via WWW, WAIS, and ftp; (b) in the Spatial Data Transfer Standard; (c) in other non-proprietary formats; and (d) in Arc Export format. USGS is participating in the development of spatial enhancements to the WAIS software.

9.4 Interfaces

In the process of implementing the NSDI, DOI bureaus are expanding and upgrading the mechanisms that provide interfaces or links from one information source to another for access to data and information. Details about these activities are described in detail in section 9.3.

9.5 Standards

The FGDC is developing standards for implementing the NSDI, consistent with OMB Circular No. A-119 ("Federal Participation in the Development and Use of Voluntary Standards") and other applicable law and policies.

Federal agencies assigned lead coordination responsibilities for thematic data categories by the FGDC are developing standards for those data categories, so as to ensure that the data produced by all agencies are compatible. DOI bureaus have responsibility for developing the following data standards:

Thematic Category	Responsible DOI Bureau
Base Cartographic	U.S. Geological Survey
Cadastral	Bureau of Land Management
Geologic	U.S. Geological Survey
Wetlands	U.S. Fish and Wildlife Service

Other Federal agencies have responsibility for developing standards for the remaining data categories. DOI bureaus collecting or producing geospatial data will ensure that such data will be collected in a manner that meets all relevant standards adopted through the FGDC process.

The Content Standard for Digital Geospatial Metadata was approved by the FGDC in 1994 to specify the information content of metadata for a set of digital geospatial data. It provides a uniform way to describe the data content, quality, condition, and other characteristics.

The Spatial Data Transfer Standard is a FIPS data exchange standard is used by DOI and other agencies to transfer geospatial data between users having different computer systems.

9.6 User Advice and Services

The FGDC has formed partnerships and is cooperating with a diverse group representing State and local government, professional societies, the National Academy of Sciences and other academic institutions, non-governmental organizations, and private industry. The primary groups are:
> The National States Geographic Information Council
> The National Governors' Association
> The National League of Cities
> The National Association of Counties
> Urban and Regional information Systems Association (URISA)
> Automated Mapping/Facilities Management International
>   (AM/FM International)
> American Society for Photogrammetry and Remote Sensing (ASPRS)
> Association of American Geographers (AAG)
> American Congress on Surveying and Mapping (ACSM)

The Mapping Science Committee of the National Academy of Sciences
National Center for Geographic Information and Analysis (NCGIA)
National Geographic Society
Advisory Commission on Intergovernmental Relations
Numerous State Geographic Information Councils

DOI is working with these groups to implement the various elements of the NSDI.

9.7 Implementation Schedule

The NSDI is being developed to meet various program milestones established by the Executive Order 12906 and the FGDC coordinating bodies.

10.0 SPECIAL DATA AND INFORMATION PRODUCTS FOR EDUCATION USE

The USGS has developed a CD-ROM-based multimedia educational system called GeoMedia and (and a sequel, GeoMedia 2) to teach middle school students about a variety of earth science subjects. GeoMedia teaches students about the hydrologic cycle, earthquakes, and maps; GeoMedia 2 covers the carbon cycle, the greenhouse effect, and monitoring changes over time. Each learning package allows students to make associative links between a mix of information such as graphics, text, animation, and sound; glossaries and reading lists are also included for each module. The system is designed to operate on Apple Macintosh computers.

USGS has also prepared a global change teaching guide consisting of a poster and activity packages with classroom exercises on topics such as dendrochronology, energy and nutrient cycling, and the effect of human activities on the Earth.

Although DOI bureaus have not prepared any other specific data products for science and education needs, many of the data sets and information access systems can be acquired for educational purposes. For example, seasonal vegetation greenness data from AVHRR data and other land-related data sets of North America are now available on CD-ROM. Users can access the GLIS at the EROS Data Center and the USGS Global Change Research Program Data Server for information about available data sets. Specific data sets can be ordered or, in some cases, downloaded directly via Internet connection.

APPENDIX A: ACRONYMS

ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVHRR	Advanced Very High Resolution Radiometer
AVIRIS	Advance Visible and Infrared Imaging Spectrometer
BLM	Bureau of Land Management
CDIAC	Carbon Dioxide Information and Analysis Center (DOE)
CD-ROM	Compact Disc-Read Only Memory
CEOS	Committee on Earth Observation Satellites
CIESIN	Center for Integrated Earth Science Information Network
DEM	Digital Elevation Model
DIS	Data and Information System
DMA	Defense Mapping Agency
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
EDC	EROS Data Center
EOS	Earth Observing System
EOSAT	Earth Observation Satellite Company
EOSDIS	EOS Data and Information System
EPA	Environmental Protection Agency
EROS	Earth Resources Observation Systems
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standard
ftp	File Transfer Protocol
GCDIS	Global Change Data and Information System
GCRP	Global Change Research Program
GILS	Government Information Locator System
GIS	Geographic information system
GISS	Goddard Institute for Space Studies
GLIS	Global Land Information System
GRID	Global Resource Information Database (UNEP)
http	Hypertext Transfer Protocol
IGBP	International Geosphere-Biosphere Programme
LPDAAC	Land Processes Distributed Active Archive Center
MODIS	Moderate Resolution Imaging Spectrometer
MSS	Multispectral Scanner (Landsat)
NALC	North American Landscape Characterization
NASA	National Aeronautics and Space Administration
NBII	National Biological Information Infrastructure
NBS	National Biological Service
NCAR	National Center for Atmospheric Research
NESDIS	National Environmental Satellite, Data, and Information Service (NOAA)
NGDC	National Geophysical Data Center (NOAA)
NMD	National Mapping Division (USGS)
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service

NRCS	National Resources Conservation Service (USDA)
NSDI	National Spatial Data Infrastructure
NTIS	National Technical Information Service
NURE	National Uranium Resource Evaluation program (USGS)
NWI	National Wetlands Inventory
OMB	Office of Management and Budget
PCGLIS	PC version of the USGS Global Land Information System
SPOT	Satellite Pour l'Observation de la Terre (French Satellite for Observation of the Earth)
TIMS	Thermal Infrared Multispectral Scanner
TM	Thematic Mapper (Landsat)
UNEP	United Nations Environment Programme
URL	Universal Record Locator
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
USMARC	U.S. Machine Readable Cataloging
WAIS	Wide-Area Information Server
WBVT	Wide-Band Video Tape
WWW	World Wide Web
XGLIS	X windows version of the USGS Global Land Information System

APPENDIX B. GCDIS LEVELS OF IMPLEMENTATION

Activity	Level	Level of Service
Connectivity	1	Data transfers to 1 Mbs
	2	Data transfers to 1 Mbs
	3	Voice-grade telephone line
	4	Regular mail
Search	1	Catalog system online with all agency's data/information described according to GCDIS standards
	2	Directory level information and agency data/information documentation online to GCDIS standards
	3	Priority data/information directory level to GCDIS standards and other data/information documentation by hard copy to GCDIS standards
	4	Existing directory level data/information by hard copy to GCDIS standards
Browse	1	Online on-demand generation of browse products
	2	Online static browse products
	3	Offline digital products (e.g., CD-ROM)
	4	Offline hard copy browse products
Order	1	Online, fully integrated with corresponding catalog system
	2	Online with manual forwarding to producing site
	3, 4	Manual forwarding through user support staff
Delivery	1	Online or offline distribution in user-chosen standard formats
	2	Online or offline distribution of standard products
	3	User choice of standard products
	4	Standard products

US Environmental Protection Agency

Global Change Data and Information System

Implementation Plan

4/6/95

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US Environmental Protection Agency

GCDIS Implementation Plan

1.0 Executive Summary

The EPA has relatively small holdings that are derived from the focused GCRP and terabytes of data that are derived from its regulatory and related programs that are potentially able to contribute to the understanding of global change. Unfortunately, these potentially contributing data are housed in data systems that have limited access, are not fully catalogued, and have been designed for very narrowly focused programs based on pollution control. For the short term, EPA will continue to seek agreements with existing GCDIS Centers to house its data derived from projects funded by the GCRP. Longer term, the EPA intends to modernize its potentially contributing data systems in a way that is compatible with GCDIS.

Further, EPA intends to develop its data systems in a way that allows the strategic, secondary use of data and information and encourages an attitude that data and information are not merely a bi-product of its programs, but an essential element of them. This involves making more of its data and information available internally and externally through standardization and improved access infrastructure. This plan briefly describes the current data and information management system and illustrates some of the directions that EPA intends to take to make its data and information publically available. Part of this strategic change is the implementation of GCDIS.

For GCDIS, the system has four important nodes: *The National Computer Center (NCC), The National Environmental Supercomputing Center (NESC), Public Access Servers, and the EPA Library System* and four descriptive user guide systems: the *Information Systems Inventory*, the *Online Library System, Access EPA*, and the *CIESIN Catalog*. These components form the basis for an expanded information system, which will serve the EPA programs, pollution prevention, place-based data integration, the science community, and the public.

The NCC and the NESC will provide inputs to the public access servers, which will form the foci for online access to EPA data and information via dialup and the INTERNET. The descriptive user guides will be used to navigate to EPA data and information in both online and hardcopy formats. The EPA Library System will provide hardcopy access, as well as referral and user assistance.

2.0 Agency Overview

The United States Environmental Protection Agency (EPA) has the primary responsibility for data and information on environmental quality and the distribution and effects of pollutants on human and ecological health. As such, it is both a supplier and consumer of information on the environment, with a large potential for beneficial interchange with GCDIS that goes well beyond

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its current role in the GCRP. However, EPA recognizes that its existing systems are not well structured to support secondary and interdisciplinary uses of data and information. According to EPA's Information Resources Management Strategic Management Planning Task Force: "EPA's investments in information have mirrored the Agency's traditional focus on single-media programs--air, water, and waste--providing an Information Resources Management (IRM) infrastructure that supports program activities, but is so highly decentralized and narrowly focused that it cannot support the Agency's overall mission. As EPA's approach to protecting human health and the environment evolves from a media-based, command and control approach to a more comprehensive cross-media approach, the Agency's management of information resources must also evolve."

This evolution has begun, but there is much to do. EPA intends to develop its data systems in a way that allows the strategic use of data and information and encourages an attitude that data and information are not merely a bi-product of its programs, but an essential element of them. This involves making more of its data and information available internally and externally through standardization and improved access infrastructure. This plan describes the current data and information management system and illustrates some of the directions that EPA intends to take to make its data and information publically available. Part of this strategic change is the implementation of GCDIS.

The EPA has relatively small holdings that are derived from the focused GCRP and over five terabytes of data that are derived from its regulatory and related programs. For the short term, EPA will continue to seek agreements with existing GCDIS Centers to house its data derived from projects funded by the GCRP. Longer term, the EPA intends to modernize its potentially contributing data systems in a way that is compatible with GCDIS, but it is not currently budgeted to do so at a level that would meet GCDIS projected schedules.

If the EPA is successful in obtaining the necessary funding, the EPA intends to develop a full catalog and access system which is interoperable with GCDIS, maintaining a level of functionality appropriate to the priority of the data assigned by the GCDIS ranking process. Under current funding, EPA is beginning an effort to develop directory and inventory information for some of its contributing program data, it is developing extensive network and telecommunications connectivity; it is enhancing its supercomputing center activities; it is developing public access servers and a public access database; and the EPA is developing plans to become a consumer of GCRP data and information (especially satellite data from the NASA Mission to Planet Earth and the NOAA Polar Orbiters).

3.0 Agency Data and Information Management

3.1 Management Structure

Although EPA's Global Change Research Program is managed by EPA's Assistant Administrator for Research and Development, there are two policy-related Global Change Programs managed by the Assistant Administrator for Air and Radiation and the Assistant Administrator for Policy, Planning, and Evaluation that deal with global change policy, adaptation, and mitigation, and the EPA research program interacts with these policy-driven

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programs to develop its research plans and prioritize its outputs. A close working relationship has been developed between policy and research, such that research projects and their associated data and information are closely aligned with policy questions.

All EPA data and information are managed under the Assistant Administrator for Administration and Resources Management/Office of Information Resources Management (OIRM) in conjunction with the EPA regulatory programs, the research program, EPA Regional Offices, and the states. The result is a relatively complex data management structure involving cooperation between many Agency programs with very different missions and responsibilities, coordinated by OIRM.

OIRM provides the telecommunications and computing infrastructure for the data centers and the general data policies, planning, and standards, but each data system is individually developed and managed by the program that is served by it. Thus, EPA has centralized data and information facilities, but its data and information are collected and managed by each of the Assistant Administrators responsible for the Agency's regulatory mission. These programs include Pesticides and Toxic Substances, Air and Radiation, Water, Hazardous Waste and Emergency Response, and Enforcement. Decisions on what data are collected and how they are stored and disseminated are made by the programs, based on their regulatory mandates, input from the ten EPA Regional Offices, and input from the states. Additionally, since many monitoring programs have been delegated to the states, most of the long term environmental monitoring data that EPA maintains are input directly by the states into EPA databases.

As such, EPA has no Global Change Research Program Data and Information System. The EPA is developing a public access system for its environmental data. The EPA implementation of GCDIS is a component of that overall system. For GCDIS, the system has four important nodes: *The National Computer Center (NCC), The National Environmental Supercomputing Center (NESC), a Public Access Server, and the EPA Library System* and four descriptive user guide systems: *the Information Systems Inventory, the Online Library System, Access EPA, and the CIESIN Catalog*. All of the nodes and the user guides are developed and maintained by OIRM with input from the programs.

3.2 User Advisory Process

The client community has a number of inputs to EPA's information resources management systems. At the strategic level, input to the OIRM is provided by an IRM Steering committee, composed of the Senior Information Resource Management Officials (SIRMOs) from each Agency organization (Assistant Administrators and Regional Offices).

At the more operational level, the EPA's infrastructure for computing, telecommunications, and information resources management is provided by the National Data Processing Division at Research Triangle Park, North Carolina (NDPD). There are a number of avenues for input from NDPD's client community:

All of NDPD's directives are formally submitted to an intra-agency review process that includes the SIRMOs. The NDPD also conducts customer surveys on a periodic basis to provide feedback on service awareness and satisfaction.

The NDPD's outreach program brings a summary of newsworthy events to each Regional Office and Assistant Administrator through a series of audio conferences. The agenda and background materials are provided in advance; the agenda is adjusted to accommodate any special interests identified by the client. There is opportunity for questions, answers, and dialogue. In addition, the NDPD makes use of the monthly SIRMO meetings held in Washington and accessible via audioconference bridge, and the regular (~quarterly) IRM Branch Chief meetings. These are also opportunities for client-identified priorities to be addressed.

Open Line, the mainframe and electronic mail "suggestion box" is available to all clients; messages received are routed directly to the NDPD Director. Subscribers to the NDPD periodicals "CONNECTION" and "II Bits" are encouraged to contact NDPD with suggestions, questions, or concerns. Specific NDPD programs maintain specific processes to assure that client priorities are reflected in NDPD projects and activities. The LAN advisory committees actually vote to rank priorities for LAN infrastructure purchases, and members of the client community are commonly asked to serve on Technical Evaluation Panels for major acquisitions. The client community has been included in all phases of planning for Working Capital Fund operations.

3.3 Budget

The EPA IRM budget is not available for fiscal years 1996 and 1997. Therefore, fiscal years 1993, 1994, and 1995 are provided for comparison and include funds budgeted for IRM activities by the EPA Regions and programs (including administrative functions). EPA does not expect major changes in its IRM budget in the near future. Prior to fiscal year 1995, OIRM and NDPD were separate organizations. A reorganization of NDPD into OIRM is planned for fiscal 1995. This is not expected to have an impact on public access or on GCDIS. Public access budgets across the Agency were collected for fiscal 1993 only. It is expected that the 1993 amounts are typical of the resources devoted to public access in the other years, as well.

	FY93	FY94	FY95
Total Agency IRM Budget	$282,408.6	$302,769.9	$318,164.0
OIRM's Total IRM Budget	$ 26,938.9	$ 28,009.2	$ 34,256.3
NDPD's Total IRM Budget	$ 69,301.7	$ 66,996.1	$ 78,282.6
PUBLIC ACCESS Budget from FY93 IRM Base Budget review	$ 4,967.9		

3.4 Schedule

The GCDIS development schedule is dependent in the short term on the development of the *Public Access Server*, the *Envirofacts Database*, and the *CIESIN Catalog*. Currently, all are in various stages of prototype development.

The *CIESIN catalog* will be available as a working demonstration by January, 1995, an operational version will be available by March, 1995, with public access available by May, 1995. The catalog will continue to develop and grow as funding permits. The *Public Access Server* is an operational prototype as of October, 1994, and the *Envirofacts Database* is available on the server beginning March 3ll, 1995 for a limited subset of EPA's data. Each of these will be accessible by GCDIS over the INTERNET.

4.0 System Overview: Tools for Access

Eventually, on line users will begin a data search with the CIESIN Catalog, the EPA Gopher, the EPA Mosaic Home Page, or the OLS and progress through the functions of browse, order and delivery by interacting with Envirofacts. At present, only the EPA Gopher and the OLS are operating. There is no current public access link with EPA monitoring data, although state and federal users of the major EPA data systems have fully functional capabilities within each system. Public ordering and delivery of data is through the National Technical Information Service (NTIS) or on line from the Public Access Server.

4.1 Online Library System

Online Library System Description

Online Library System (OLS), resides on the IBM mainframe under TSO. The mainframe is located at the National Computer Center, Research Triangle Park, North Carolina. OLS is a bibliographic database which references the information resources maintained by the EPA Library Network. It contains bibliographic citations from books, EPA and other federal agencies technical reports, conference proceedings, indexes, audiovisual materials, maps, journals and a variety of other documents held in the collections of EPA Headquarters, Regional and Laboratory Libraries. OLS also provides abstracts of selected titles. OLS contains the following related databases: Hazardous Waste Superfund Collection Database, Environmental Finance and Information Network (EFIN), National Center for Environmental Publications and information (NCEPI) and Regional Files from certain EPA Regional libraries.

Online Library System Standards

OLS is written in BASIS and is currently migrating to BASIS Plus. The operating system is IBM MVS/TSO. The software for OLS is BASIS and it resides on an IBM ES9000.

Online Library System Interfaces

OLS interfaces with the EPA Public Access Server.

Online Library System Content

OLS provides bibliographic citations on a variety of environmental topics and in some databases abstracts are provided. OLS is made up of 8 related databases. They are:

National Catalog (NCAT) contains bibliographic citations for the collections held in the 28 EPA Library. It also contains citations and abstracts of EPA publications submitted to the National Technical Information Service. Updated every two weeks

Hazardous Waste (HAZW) contains citations and abstracts for key materials on hazardous waste. It includes the Office of Solid Waste and Emergency Response (OSWER) directives. Updated Quarterly

Access EPA (AC93) contains over 300 entries for EPA and other public sector information sources such as hotlines, clearinghouse, dockets, and libraries. Updated Interactively

Environmental Finance and Information Network (EFIN) contains abstracts of case studies and contracts on environmental finance topics, including federal grant and loan programs, alternative financing mechanisms and public-private partnerships. Updated Interactively.

National Center for Environmental Publications and Information (NCEPI) is a listing of EPA publications and includes publications titles, EPA publication numbers NTIS and/or GPO numbers. It is updated biweekly.

Regional Files contains citations for selected collections of the *Regions 1, 5, and 9 Libraries.*

Online Library System Access

OLS may be accessed through several methods. Dialing in with a modem, telnet to INTERNET address or through the EPA Public Access Server. EPA staff may access OLS through two additional methods, the SNA Gateway and through the NCC data switch. OLS is compatible with most telecommunication software packages.

Dial In: (919) 549-0720;
"IBMPSI"/"OLS"/"A";
(300-9600 baud; even parity; 1/2 duplex; 7 databits; 1 stop)

INTERNET: epaibm.rtpnc.epa.gov
"Public Access"/"OLS"/"A"
or
The EPA Public Access Gopher site.   gopher.epa.gov

<u>Online Library System User Advice and Services</u>

OLS provides help screens which list the 28 EPA Libraries and Program Office for each database. The help screens also provide assistance in developing search strategies.

There are several levels of user support. EPA's National Computer Center provides support for technical system assistance . For information about the system users can contact the EPA National Library Network Program Manager. User guides and brochures may be obtained from the EPA Public Information Center. Librarians at the 28 EPA Libraries respond to questions on how to search the database.

4.2 Information Systems Inventory

The Information Systems Inventory is an index and pathfinder to EPA's computer-based information systems and applications. ISI was developed to enhance the Agency's ability to track major information systems and share information across media and program boundaries.

Software for ISI is dBase with Clipper. The disk is compressed using PKZIP and must be unzipped upon loading (read instructions in user's manual and/or in "Read.me" file on diskette). The program requires 4.0 Mb free hard disk space, and the diskette is 3.5" high density.

Selected publically available portions of the ISI are mounted on EPA's Public Access Gopher Server.

The Information Systems Inventory describes approximately 500 EPA systems, databases, models, modules, and other computer applications, and gives the name and phone number of someone to contact for further information about each entry. Entries under each system in the inventory include: system name and acronym, system level, responsible organization, contact person, legislative authority, database descriptors, access information, hardware and software, system abstract, and key words.

The Information Systems Inventory is available in hardcopy and automated forms in the EPA Headquarters and Regional libraries, and through the National Technical Information Service (NTIS).

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Telephone: (703) 487-4650
Rush Orders: (800) 553-NTIS
FAX: (703) 321-8547
Telex: 89-9405 (Domestic)
64617 (International)

Hardcopy or diskette versions of ISI are also available at no charge to EPA users, State and Local Governments, and educational institutions through EPA's Public Information Center.

U.S. EPA
Public Information Center, 3404
401 M Street, ST
Washington, DC 20460
Telephone: (202) 260-2080

ISI is one component of the EPA/NDPD "EPADOC" CD-ROM product available free of charge to Agency employees. The public can purchase the CD-ROM from the Government Printing Office.

Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Telephone: (202) 783-3238

ISI can also be found at most libraries participating in the Federal Depository Library Program (FDLP).

4.3 Access EPA

Access EPA is produced to promote the awareness of and enhance public access to EPA's environmental information resources. It provides contact information and a description of services for more than 300 of EPA's major information resources. Coverage includes the United States, its territories, and all areas served by the offices and representatives of EPA. It has been published annually since 1991. However, the 1994 revision is available in electronic format only. It can be searched online or purchased through either the U.S. Government Printing Office or the National Technical Information Service. Access EPA on EPA's online library system can be searched using Titles, Subjects, Keywords or Public Contacts. A help menu is available. On EPA's gopher server, a WAIS searching tool is available.

The diskette version available through GPO or NTIS is stored as an ASCII DOS file and can be used with any DOS-based word processing program including WordPerfect or Microsoft Word.

Access EPA includes chapters on dockets, clearinghouses and hotlines, records, databases, models and EPA libraries. Each of the chapters begins with a brief introduction, table of contents, and any supplementary information Following the eight chapters of information contacts is a list of acronyms, an index of Library and Information Services by State and a name/title/subject index.

Instructions for using Access EPA online, can be found on the OLS menu under the heading "Help Access EPA." Access EPA is also available at all libraries participating in the Federal Depository Library Program, as well as many main and branch public libraries and academic libraries. Sales of Access EPA are handled by the following entities:

GPO Order Desk
710 N. Capitol Street
Washington, DC 20402
Telephone: (202) 783-3238
FAX: (202) 512-2250
GPO Federal Bulletin Board System:
(202) 512-1387
Price: Hardcopy $24.00, Diskette $15.00,
Download $7.00
GPO Stock Number: 055-000-00437-4

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650
Rush Orders: (800) 553-NTIS
FAX: (703) 321-8547
Telex: 89-9405 (Domestic)
64617 (International)
Price: Hardcopy $ 24.00
NTIS Number: PB93-170041

4.4 CIESIN Catalog

As part of its efforts to increase public access to environmental data, EPA has provided
assistance to the Consortium for International Earth Science Information Network (CIESIN) to
enable them to develop a prototype catalog of environmental information. CIESIN is developing
directory, inventory, and guide portions of an environmental catalog, using selected EPA
databases. CIESIN is maintaining these on one of its servers, which is interoperable with the
other components of GCDIS and publicly available over the INTERNET. The CIESIN Catalog
provides appropriate linkages to the U.S. Global Change Research Information Office (GCRIO),
which was implemented by CIESIN. Additionally, CIESIN has developed a prototype Great
Lakes Regional Environmental Information System, compatible with the Great Lakes Information
Network and GCDIS, which is accessible by the environmental community over the INTERNET.
 The Great Lakes prototype is intended to be the paradigm for other efforts in the process of
development, including environmental information systems for large geographic regions such as
the US-Mexico border area, Chesapeake Bay, and projected for the Gulf of Mexico, the Pacific
Northwest, and geographic areas in the former Soviet Union/ Eastern Europe. The purpose of
these efforts, taken together, is to increase the public availability of environmental data and to
facilitate human dimensions and earth science data integration for improved decision making at
the local to global level.

Directory

The directory component of the catalog system provides a representation of socioeconomic, public health, and environmental data or information in the form of metadata (data or information about data). This metadata describes the data content concisely and precisely, and is provided electronically through the catalog as searchable fields of descriptive information that permit the location and retrieval of metadata. The directory for both the national level catalog and the Great Lakes and the U.S.-Mexico Border regional environmental information systems will assist users in locating information about subject matter, even if the user is uncertain about the existence of that information, and will help them to evaluate the information as to its utility and relevance. Directory entries describe aggregated data such as a major database, a time-series, or a collection of data sets or reports. These entries are searchable via the INTERNET by means of Catalog client software that allows the user to either browse the available directory entries or search for data sets using selective criteria. The directory is compatible with the NASA Global Change Master Directory (GCMD), which utilizes the Directory Interchange Format (DIF) as the standard format for directory entries, and is Government Information Locator Service (GILS) compliant as well. Directory entries are developed using the DIF and Spatial Metadata Standards with modifications considered to best accommodate EPA metadata requirements. Indexing vocabulary appropriate to environmental data is also being developed and applied.

CIESIN is developing an inventory and models of EPA data assets to enhance public access to those national assets. In addition, this effort will contribute to the process of planning for Envirofacts, a proposed national repository of environmental information. The results of these efforts will lead to improvements in the ability of the scientific, policy-making, commercial, and public communities to access and understand environmental data. The products of these efforts will include a series of dataset modeling reports and a document that prototypes a logical model for unifying two or more EPA systems. EPA data were selected to represent typical environmental data needed for a broad variety of decisions.

Guides

Guide metadata contain detailed information designed to complement directory metadata by providing context and background information. Three kinds of guides are being developed for the environmental catalogs--data set, organization, and program/initiative. Data set guides provide an overview of the data set details on its source and history, access to variable lists and data dictionaries if available, and guidance in using the data set. Organization guides give the user additional in-depth information concerning the data center which created, owns, or maintains the data set. Program or initiative guides provide the user key information on relevant programs, projects, or initiatives.

The guide component of the catalog system will provide organizational, dataset, and program information in the form of hypertext documents presented by a World Wide Web (WWW) browser. These hypertext documents allow the user to navigate smoothly through a series of text screens, whose physical location may be distributed throughout many remote computer sites, but which are conceptually linked on the user's screen via highlighted keywords, phrases, lists, graphics and icons. These highlighted tokens are woven into the text of individual

documents so that the user may interact with the information more naturally than with a fixed set of menus and forms. The guides contain content-sensitive linkages to appropriate locations within the CIESIN Catalog Services, providing ease of two-way transfer between the various services offered by CIESIN. Guides will contain live links to other Wide Area Information Servers (WAIS), WWW, and Gopher servers as appropriate. The guides themselves will also be full-text indexed for WAIS searches.

Great Lakes Regional Environmental Information System

The goal of the Great Lakes Regional Environmental Information System is to install a computer-based environmental information system that establishes within the Great Lakes area the capability to assimilate environmental data of various types and from distributed sources, and to use that data to create information necessary for local risk assessment and for promoting regional, environmentally sustainable development. CIESIN is making an inventory of the existing information and databases in the Great Lakes area, and is making this inventory available to those who are developing plans to augment monitoring efforts and mitigation activities in the region. In addition to developing regional directory and guide metadata, the effort is identifying, developing where necessary, and disseminating information products and a framework of tools, tailored to the needs of policy analysts and the public, that integrate environmental data, and that integrate these data with socioeconomic information. The operational system will illustrate the integration of geographic information system capabilities (e.g., spatial data display and analysis), distributed data access, statistical analysis and display, and interactive modeling. The effort will increase the capacity of the user community to make effective use of environmental information and information technologies in decision making.

4.5 Data Communications Network

EPA's data centers are tied together through an extensive data communications network. The Agency's data communications network is designed to provide support to a wide range of clients including EPA regional offices and laboratories, state and local agencies, and public access. Research Triangle Park (RTP), NC, Washington DC, and Cincinnati, Ohio are connected by a triangle of T-1 circuits. Additionally, the National Environmental Supercomputing Center (NESC) in Bay City, Michigan, is connected to RTP with a T-3 circuit. EPA's ten regional offices are connected via 56Kbps circuits to both RTP and Cincinnati. All fifty state agencies, as well as Puerto Rico, are connected by analog circuits to the regional offices. INTERNET connectivity is supported at the T-3 level through a connection at Bay City.

At the workstation level, the Agency supports approximately 19,000 Token-Ring and 2,500 Ethernet LAN connected stations. Currently, IBM, VAX and Cray registration is at 12,586 user id's. Virtually all EPA users have the potential for INTERNET EMAIL access through the Agency's internal EMAIL system, although all employees are not connected to the internal system. EPA also maintains full INTERNET connectivity to selected workstations throughout the Agency.

5.0 National Computer Center

5.1 Description

The EPA's National Computer Center (NCC), located at Research Triangle Park, NC, was founded in 1971 as the Research Triangle Computing Center with a primary focus on EPA's Air Quality research and enforcement programs. It was renamed the NCC in 1975, to reflect a more nationwide mission. In 1980, all the Agency's data processing and telecommunications capabilities were consolidated under the NCC.

Today the NCC is a large, standardized, integrated, high speed computing center with a computing environment that varies from workstations to a large IBM mainframe. Its mission is to support the Environmental Protection Agency in the areas of scientific, regulatory, and administrative applications. The NCC serves EPA customers and other qualified agencies and contractors through a telecommunications network which allows the distribution of computer services to remote locations. Along with hardware and software, and the means to communicate data, the NCC provides customer support and problem solving services.

The major operations center of the NCC is in Research Triangle Park (RTP), North Carolina. The RTP facility has three principal data processing capabilities:

* IBM-compatible mainframes.

* DEC minisystem operation.

* Micro/mainframe support for uploading and downloading data on personal computers.

All NCC operations are conducted at the center in RTP and at the Washington Information Center (WIC). The WIC provides EPA Headquarters customers with remote access through its high-speed communications links to RTP's computer resources. The computer center supports all 10 EPA regional offices, State environmental offices and the EPA labs throughout the country.

The NCC provides a variety of services for its customers in seven major areas as described below:

* *Planning and Acquisitions.* Mainframe, Mini, or personal computer hardware and software requirements, as well as telecommunications and operating system needs, are identified, planned, and procured.

* *Computer Operations.* The mainframe processors are monitored and maintained through consoles at the NCC. NCC has a high level of automation in the data center. Automated Tape Libraries robotically mount 98% of the tapes, on-line viewing eliminates the need to print large volumes of print, and state-of-the-art Direct Access Storage Devices(DASD) require no operator intervention. NCC has a hierarchical storage management software package that allows data sets to automatically migrate to a less expensive storage media based on age.

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* *Telecommunications.* NCC Telecommunications provides network-related consulting and technical assistance, infrastructure changes such as wiring and hardware installation, for the Wide Area Network(WAN), technical review and approval for Agency-supported Local Area Networks(LANs), international telecommunications, voice telecommunications, including telephone, voice mail, and voice processing, and videoconferencing services in support of EPA's WAN and LANs.

* *Network Systems.* NCC's Network Systems staff installs and maintains all telecommunications software and system software products. These programs enable communication among all parts of the network. Network Systems also reconfigures the systems for maximum computer performance and installs and maintains system software, operating systems, and programming languages.

* *Customer Support.* The Customer Call Center is the primary point of contact between the NCC customer community and the NCC's computers. The Customer Call Center in RTP solved over 20,000 customer problems last year in many areas such as graphics, PCS, fourth generation languages, programming languages, and information systems. Overall. Customer Support resolves problems associated with approximately 75 software products. When you contact the Customer Call Center, a Specialist works with you to define the problem. The Specialist records this information in the central problem management system and then either solves the problem first level or directs the problem to the appropriate second level specialist for resolution.

* *Data Base Support Services.* NCC Data Base Support Services supports the Central Data Base Administration in all facets of central data base administration. These tasks include such activities as operating the Development, Production, Test, and Quality data base environments; testing, implementing, and maintaining all Data Base Management Systems(DBMS) software; providing technical consultation to Project Managers, developers, and Application Data Base Administration(ADBAs) in the data base environment; solving Central DBMS technical problems; and controlling central environmental data bases, data base files/tables, and disk space.

* *Information Centers.* NDPD's Information Center Branch (ICB) operates the Washington Information Center at the EPA Headquarters and three information centers in RTP. These centers serve the Agency's administrative, scientific, and standards and regulations communities. Through its National Information Center Exchange (NICE), ICB also coordinates common activities among information centers Agencywide. The IC's mission is to help EPA personnel do their own computing using mainframe, minicomputer, and personal computer technologies and make appropriate use of the Agency's national telecommunications network and LANs. IC staff help customers learn to use automated tools independently and to use and manage information.

The NCC responds to the demands of new environmental legislation, serves as the central medium for storing and processing information, and provides nationwide services and support to over 25,000 Federal, state, and local users of the Agency's information resources. Each year it receives information inquiries from these users and solves and documents problems for them. In addition, it supports their hardware, software, telecommunications, and operations needs. The NCC would form the cornerstone of EPA's implementation of GCDIS and would contain most of the contributing data provided by the Agency.

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5.2 Content

EPA's potentially contributing data to GCDIS result from a broad range of programs aimed at improving human and ecological health, assessing environmental risks, and preventing environmental pollution. Data from EPA's own programs, as well as data from programs delegated to the states, are stored in a variety of databases at the EPA NCC. These include data and information on:

Ambient Air Quality, Source, Emissions, and Compliance
- Emissions and Compliance from Industrial Plants
- Overall Status of Air Quality
- Reference Information (ie. FIPS Codes)
- Emissions from Area and Mobile Sources

Ambient Water Quality, Source, Emissions, and Compliance
- Public Water Supplies and Compliance with Regulations
- Marine Monitoring Data Pertaining to water Quality, Oceanographic Descriptions, Sediment Pollutants, Physical/chemical Characteristics, Biological Characteristics, and Estuary Information
- Permit Compliance Data
- Waterway Parametric Data, Ambient, Intensive Survey, Effluent, and Biological Water Quality
- Specific Releases of Oils and Hazardous Substances

Hazardous and Solid Waste
- Demographics of Hazardous Waste Generation and Management
- Superfund Site Data
- Chemical Properties, Regulatory Information, Safety Data, and Toxicity Data for Emergency Response
- Superfund Cleanup Records of Decision
- Tracking of Generation, Transportation, Treatment, Storage, and Disposal of Hazardous Waste
- Information on Regulated Chemicals used in Commerce

Pesticides and Toxic Substances
- Tracking and Registration of all Pesticide Producing Establishments
- Test Data used to Monitor Health, Ecological, and Safety Effects of Toxic Chemicals Used Within Industries
- Toxic Release Inventory

Cross-Program
- EPA's Civil Judicial Enforcement Activity
- Environmental Monitoring Methods Index
- Reference Information of Facilities
- Construction Grants on Wastewater Treatment
- Summaries of Health Risk and Regulatory Information
- On Line Library System
- Monitoring Data for the Nation's Ecosystems (EMAP-Under Development)

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5.3 Access

The data listed above are stored at the NCC either on rotating Direct Access Storage Devices (DASD) or on magnetic tape media. The main stream EPA computer systems have several levels of security to ensure the integrity of the data. This security on the IBM mainframe is enforced by using IBMs Resource Access Control Facility (RACF) and access to the data can only be granted by each program's RACF Security Administrator.

A small subset of the NCC's data may be accessed by anonymous FTP.

5.4 Interfaces

The NCC supports different interfaces to each of its data systems. These, in turn, access various database management systems. No common interface, DBMS, or data dictionary exists, or is likely to exist in the short term. Data and information must be extracted into Envirofacts and normalized, before reasonable online public access will exist. The paradigm for which the interfaces and systems were developed is evolving from narrow "stovepipe" systems to more open, standardized systems with compatible data models.

Library interfaces include the OLS and Access EPA. A high level description of the NCC systems is given in the ISI, and some of the holdings will be described in the CIESIN Directory. Users can obtain data by contacting the individuals and programs listed in these references.

5.5 Standards

EPA adheres to appropriate Federal Information Processing Standards and Executive Orders in the operation of all its data and information facilities.

5.6 User Advice and Services

User advice and services are well-developed for internal users, but virtually non-existant for external users.

5.7 Implementation Schedule

EPA does not intend to create direct, online access to the Agency's legacy databases in the near term. This is largely due to the technical difficulties present in developing a single interface to vastly disparate systems using different database management systems, data dictionaries, and data structures. EPA intends to extract subsets of the data and information from the NCC and make them available on public access servers.

6.0 National Environmental Supercomputing Center

6.1 Description

The National Environmental Supercomputing Center (NESC) at Bay City, Michigan, is the world's only supercomputer center devoted exclusively to environmental problems. The NESC supports EPA modeling efforts in regional air models, in large ecosystems such as the Chesapeake Bay and Great Lakes, and in computational chemistry for the study of toxics. The NESC also supports modeling activities related to the effects of climate change on terrestrial ecosystems.

The NESC provides EPA programs with the ability to simulate environmental systems via mathematical models too large to be executed on conventional computers. The cost and time savings of modeling versus field testing allow EPA to test environmental strategies on the computer without going through the costly and time consuming process of trial and error using the regulatory process. Its role in GCDIS will be to provide a vehicle for processing environmental models and remote sensing data to create information supporting both research and policy formulation.

6.2 Content

The NESC is a supercomputing facility, rather than a repository for primary data. However, the NESC does maintain the results of models of potential interest to global change researchers: process models of ecosystems such as the Chesapeake Bay and Great Lakes, models of the effects of pollutants on human and ecological health, and models describing regional tropospheric ozone and acid deposition. At this writing, no basic policy has been set by EPA regarding the retention or dissemination of these model results.

Specific programs, such as the Air Program, are making quality assured model results, such as those from the Regional Oxidant Model, available through anonymous FTP at the NCC.

6.3 Access

Access to the NESC is granted to EPA project participants and cooperative partners outside the Agency, based on proposals for supercomputer use. These projects are ranked and allocated supercomputer time based on scientific merit and Agency priority.

Anonymous FTP has been discussed, but not yet approved.

6.4 Interfaces

No interfaces are available to the public.

6.5 Standards

EPA adheres to appropriate Federal Information Processing Standards and Executive Orders in the operation of all its data and information facilities.

6.6 User Advice and Services

User advice and services are available only for holders of valid accounts.

6.7 Implementation Schedule

No implementation schedule is available.

7.0 The Public Access Servers

7.1 Description

The EPA portion of GCDIS will consist of components accessible at various prototype levels over the INTERNET via UNIX public access servers at RTP, NC. The public access server will be developed as part of EPA's general strategy to increase access to all its environmental data and includes efforts focused on the USGCRP, as well as other areas.

Due to the differences between data systems constructed for single purposes, EPA is developing a composite relational database, *Envirofacts*, which will contain extractions from the program databases to be made available to the public. *Envirofacts* currently contains pollutant source information from EPA's Facility Index System (FINDS), Permit Compliance System (PCS), Toxic Release Inventory System (TRIS), Resource Conservation and Recovery Act Information System (RCRIS), and theComprehensive Environmental Response, Compensation, and Liability Act (Superfund) Information System (CERCLIS). It the near future, it is scheduled to include the new STORET water monitoring database, and work is proceeding on incorporating the AIRS (Air and Radiation data and information) databases by the end of FY 1995. Additional programmatic and monitoring databases will be included in the future.

The *Envirofacts* database architecture and structure is currently supported by Version 7.0 of the ORACLE RDBMS and is available on line through the Public Access Server beginning on March 31, 1995 for a 90-day test period. Directory search is possible through the use of WAIS software or the CIESIN Catalog System. Browse and delivery are available on line over the Internet through SQL commands in the ORACLE RDBMS. There are currently no user charges for using this system.

Extractions from selected Program databases and model results will be made available as part of the *Envirofacts* database. The Servers will support INTERNET search tools (such as Gopher, WAIS, and Mosaic), and contain both data and pointers to data and information. Supported tools will be interoperable with appropriate components of GCDIS. Electronic versions of *Access EPA, the Toxic Release Inventory, the Guide to Selected National Environmental Statistics in the US, the Online Library System,* and the *Information Systems Inventory* will also be available on the Servers to assist users in obtaining EPA information available on line and by hardcopy.

Extensive data and information from the *focused* portion of the GCRP (such as the North American Landscape Characterization data set) will be made available through arrangements with other GCDIS archives. Such data sets will be pointed to by the public access Servers. Small data sets will be made available directly from the UNIX Servers. *Contributing* data and information from EPA's regulatory and scientific programs, not derived from the GCRP activities, will be incorporated into the *Envirofacts* database on the Servers, or pointed to in some instances, as funding becomes available and requirements are known from the GCRP.

7.2   Content

All Agency information available for inter-agency and public access is available via the Gopher, Mosaic, and WAIS user interfaces. For information on these tools, the reader is directed to the wealth of guide and instructional materials available on-line and in all bookstores.

Agency Information (examples)
o   Press releases, calendars, announcements, speeches
o   Consumer Information
o   EPA Initiatives, Policy and Strategy Documents
o   Rules, Regulations and Legislation
o   EPA Standards
o   Science, Research and Technology
o   Information about Grants, Contracts (RFPs), and Job Vacancies
o   Newsletters and Journals
o   Agency Locator
o   Software

Environmental Data (examples)
o   Toxic Release Inventory
o   RCRA Biennial Report
o   EMAP (Environmental Monitoring and Assessment Program) Field Data
o   National Estuaries Program Metadata and Data
o   Gulf of Mexico Program Metadata and Data
o   Great Lakes Program Office Metadata and Data

Access Pointers (examples)
o   National Estuaries Program Cooperating Agencies
o   Gulf of Mexico Program Cooperating States and Federal Agencies
o   GLIN - Great Lakes Information Network
o   On-line Library System
o   Agency Bulletin Boards (AIR TTN, CLU-IN, Region 10 FOIA)
o   The White House WWW Server

7.3 Access

EPA currently maintains two Public Access servers accessible via the INTERNET: gopher.epa.gov, and www.epa.gov.

For those without access to their own Gopher client, the Agency maintains a restricted-use Gopher client with download capabilities. Telnet to earth1.epa.gov, and choose menu selection "1. EPA Public Access Gopher Client." "Lynx" access to the WWW server is planned at the same address.

7.4 Standards

The Agency's Public Access servers adhere to the standards (defacto and federal) required for participation in the world-wide INTERNET client-server information navigation tool set. These are Z39.50 for WAIS, and the Gopher and World Wide Web (hypertext) standards.

EPA adheres to appropriate Federal Information Processing Standards and Executive Orders in the operation of all its data and information facilities.

7.5 Implementation Schedule/Budget

October 1995 ($1.4M)
o   Increased Data Holdings
              - "Envirofacts" (RCRIS, CERCLIS, FINDS, TRI, PCS)
              - EMAP
              - GILS Metadata
              - Selected FOIA materials
o   Improved Applications Interfaces
              - Mosaic/SQL to selected databases
              - Geographic (map-based) data selection
o   Modest conversion of existing Agency and ORD reports

October 1996 (specific budget unknown - same order of magnitude as FY95)
o   Increased Data Holdings
              - IDEA
              - EMAP
              - Increased FOIA materials
o   Further advances in Applications Interfaces to data
              - Envirofacts
              - Inter-agency databases (USGS, NBS, Gulf of Mexico cooperators)
o   Initial implementation of requirements for electronic/on-line publication of Agency
       reports

October 1997 (no specific budget plans in place)
o   Agency policy for electronic/on-line publication of all reports

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7.6 Interfaces

Interfaces are Gopher, Mosaic, WAIS, the OLS, and the CIESIN Directory.

7.7 User Advice and Services

User services are available through a telephone help line at 919-541-7862 and at INTERNET address:

internet_support@unixmail.rtpnc.epa.gov

8.0 The EPA Library Network

8.1 EPA Library Network Description

The EPA Library Network is composed of 28 libraries located at the Headquarters Office in Washington, D.C., ten Regional Offices, laboratories, research centers, and field offices. The libraries support the research and other work performed by staff at each facility. The mission of the EPA Library Network is to improve access to information for EPA decision making. The Network is coordinated by the National Library Network Program, which provides an overall framework to help the libraries accomplish the Network mission, issues Agencywide policy and guidance to standardize policies and procedures, and facilitates client and library network communications. The Program also coordinates links between network libraries and other Agency information services such as clearinghouses, information centers, hotlines, and dockets.

8.2 EPA Library Network Content

The EPA Library Network is composed of a Headquarters Library, ten libraries located in each of EPA's Regional Offices, nine laboratory libraries, and special libraries located in EPA's Headquarters, Regional, and Field Offices, and Research Centers around the country. The EPA Library Network contains the following special libraries:

A.W. Breidenbach Environmental Research Center Library - based on the merger of the Public Health Service and Federal Water Pollution Control Administration libraries in 1971. At one time this library served as the scientific and technical focal point for the entire EPA Library Network. Its collection focuses on bacteriology, biotechnology, toxicology, wastewater treatment, water pollution and water quality. In addition the library has special collections in risk assessment, hazardous waste, total quality management, environmental law, and EPA test methods. Reference assistance is provided to EPA staff and the public.

Atmospheric Sciences Modeling Division Library - part of the EPA and NOAA Library Networks. The library's collection focuses on the meteorological aspects of air pollution, climate change analysis, and geophysical studies. The collection contains more than 50,000 books,

technical reports, journals, microfiche, climate data reports, surface and vorticity charts, and topographical maps and atlases. The library provides reference to the Division, as well as to EPA and NOAA staff working around the country.

Environmental Criteria and Assessment Office Technical Information Unit - provides technical support to the ECAO-Cincinnati. TIU staff acquire, process and maintain a collection of documents and references relating to the risk assessment of environmental pollutants in human health. The staff also maintain a collection of background documents for the Agency's Integrated Risk Information System (IRIS). Reference services are provided to EPA staff, primarily staff in ECAO-Cincinnati.

INFOTERRA/USA Unit - the U.S. national focal point for INFOTERRA, an international environmental reference and referral network coordinated by the United Nations Environmental Programme and located at the EPA Headquarters Library. The INFOTERRA staff maintain an international collection developed to support its response to international requests for EPA and environmental information. The unit provides reference and referral services to policy makers, scientists, researchers, industry, and the public.

Law Library - maintained by EPA's Office of General Counsel to provide legal information services, primarily to EPA staff at the Headquarters and Regional Offices. The collection contains more than 11,000 volumes of legal and law-related material concentrating on federal law, with special emphasis on administrative and environmental law. Included are statutes, codes, regulations, case reporters, digests, and legal references sources. Reference service is provided to EPA staff, private law firms, and law schools across the country.

Legislative Reference Library - maintained by EPA's Office of Congressional and Legislative Affairs to provide federal environmental legislative information for the Agency. The library collection contains more than 8000 Congressional documents including bills, reports, public laws, hearings, Committee prints, and related information. The library tracks the status of current environmental, budget, and federal personnel legislation, and maintains an automated catalog of Congressional hearings in its collection. The library staff provides extensive reference assistance to EPA employees, and limited assistance to the public.

Library Services Office - Research Triangle Park, North Carolina - provides support for EPA's ffice of Air Quality Planning and Standards, Environmental Criteria and Assessment Office-RTP, and EPA's National Computer Center. The library's collection concentrates on all aspects of air pollution, the basic sciences, chemical toxicity, and has some coverage of business and economics topics. The collection's historical coverage of air pollution information is particularly strong. Reference and referral services are provided to anyone who calls of contacts the Library via electronic mail. The Library also operates the Air Information Center (AIC) for the Office of Air Quality Planning and Standards, handling requests for air pollution information and documents from all over the world. AIC staff provide free literature searches to State and local air pollution agency employees.

National Enforcement Investigations Center Library - operated by EPA's Office of Enforcement and Compliance Assurance. The collection includes case files, technical reports, data compilations, and background information used to develop the basis for field studies and

enforcement actions; research reports on abatement practices; enforcement conference and environmental law materials; and technical reference materials in chemistry, pesticides, toxic substances, air technology, and hazardous waste. The Library provides reference services in support of the NEIC mission to EPA staff and other environmental enforcement personnel. The staff also provide telephone reference and referrals service to the public.

Office of Pollution Prevention and Toxics Library - operated by the Office of Prevention, Pesticides and Toxic Substances. The Library support programs under the Toxic Substances Control Act and the Emergency Planning and Community Right to Know Act, including the Toxic Release Inventory. The collection includes information on topics such as biotechnology, chemistry and toxicology, carcinogenesis and mutagenesis, risk assessment, environmental health and safety, and pollution prevention. Extensive reference service is provided for OPPT and other EPA staff at Headquarters and Regional Offices. Referral services and limited reference service are available to the general public. Library staff also handle information requests received through the Toxic Release Inventory User Support Hotline on 202-260-1531.

The EPA Library Network produces and contributes to numerous educational products, including the following:

ACCESS EPA - a directory of environmental information resource centers containing descriptions and contact information for documents, dockets, clearinghouses, hotlines, records management programs, EPA libraries, databases, models, information centers, and State environmental libraries. This publication helps the general public gain access to EPA information. Available online through the Online Library System Core List for an Environmental Reference Collection - identifies key books, reports, and documents for research in environmental protection, management, and science. Available from EPA's Headquarters Public Information Center

EPA Journal Holdings Report - an annually updated list of serial publication subscriptions and holdings for the EPA Library Network. The list, which includes an alphabetical list of serial titles and a reference list of EPA libraries, encourages resource sharing and improves access to journal articles. Available through the National Technical Information Service EPA/NOAA LINC CD-ROM - an automated catalog of the holdings of the EPA and NOAA Network Libraries in CD-ROM format. Contact the nearest EPA or NOAA Library for information on the availability of this product.

Index to EPA Test Methods - an index to sources of EPA test methods and sampling procedures for laboratory analysis. Hardcopy version available through the National Technical Information Service; disk version available from the Region 1 (Boston) EPA Library

More detailed information on each of the libraries in the EPA Library Network is available in ACCESS EPA, the Agency's directory of information resources and products, which is accessible on the Network's Online Library System.

8.3 EPA Library Network Access

The Library Network has access to INTERNET, to the EPA Public Access Servers, and to GCDIS. All of the libraries within the Network are open to the public, although the level of

service provided at each library varies. The libraries are generally open during regular business hours, but users should check with specific libraries for public access hours. Detailed information about public access and services at each of the libraries can be found in ACCESS EPA, the directory of EPA information resources and products. An online version of ACCESS EPA is available through the Online Library System, an automated catalog which can be accessed by a direct dial link to EPA's National Computer Center, or through the INTERNET.

8.4 EPA Library Network Interfaces

Information about the information resources held by the EPA Libraries is listed in the Network's Online Library System (OLS). OLS is publicly available through a direct dial link (919-549-0720) to EPA's National Computer Center in Research Triangle Park in North Carolina, and through the INTERNET, a broad network of interconnected computer networks. Detailed information about accessing and using OLS is contained in ACCESS EPA, in the section titled "Major EPA Environmental Databases." OLS is compatible with most telecommunications software packages. In addition to OLS, most of the EPA Library Network's holdings can be found on the Online Computer Library Center's (OCLC) national cataloging system.

The INFOTERRA/USA unit is the Network's interface for international environmental information.

8.5 EPA Library Network Standards

The EPA Library Network adheres to standards outlined in the Agency's Information Resources Management Manual.

8.6 EPA Library Network User Advice and Services

The EPA Library Network provides reference and referrals on EPA and environmental information to EPA staff, environmental organizations, the regulated community, industry, academia, and the general public. The level of service provided to these groups varies from library to library, and users should consult ACCESS EPA to obtain information about services offered at any one library. All of the libraries provide access to the information resources of the entire network either through the Online Library System or through the EPA/NOAA LINC CD-ROM, an information product containing the holdings of the EPA and NOAA Network Libraries. Some of the libraries conduct subject searches for the public, and other provide this service only for EPA staff. All of the libraries participate in reciprocal interlibrary loan activities with libraries worldwide.

More detailed information on specific services offered by each of the EPA Network Libraries is available in ACCESS EPA, the Agency's directory of information resource centers and products, which is accessible through the Network's Online Library System.

8.7 EPA Library Network Implementation Schedule

Due to the diversity and number of Agency programs participating in the funding and management of the EPA Network Library activities, this information is not available.

APPENDIX A:
USEPA GCDIS NODE DESCRIPTIONS

GCDIS access implementation levels are defined by the following table:

GCDIS ACCESS LEVELS

Level	Connectivity	Search	Browse	Order	Delivery
1	Data transfers greater than 1 Mbps (ie. T-1, T-3, etc.)	Full Catalog system on line with all agency's gcd/i described in accordance with GCDIS standards	On line dynamic browse product generation	On line GCDIS integrated	User choice, on/off line via standard formats (ie. user boolean or spatial subsets/ joins)
2	Data transfers to 1 Mbps	Directory level info and agency gcd/i documentation on line to GCDIS standards	On line static browse products	On line with manual forwarding	User choice, on/off line standard products
3	Voice-grade telephone line	Priority gcd/i directory level info to GCDIS standards and gcd/i documentation by hard copy to GCDIS standards	Off line digital browse products	Manual interface	User choice of standard products
4	Regular mail	Existing directory level gcd/i and hardcopy documentation available to GCDIS	Off line hard copy browse products	Manual interface	Standard products

gcd/i = Global Change Data and Information

Organization: USEPA National Computer Center, Research Triangle Park, NC

Data System: National Program Data Systems

Description/Purpose: The EPA's National Computer Center (NCC), located at Research Triangle Park, NC, was founded in 1971 as the Research Triangle Computing Center with a primary focus on EPA's Air Quality research and enforcement programs. It was renamed the NCC in 1975, to reflect a more nationwide mission. In 1980, all the Agency's data processing and telecommunications capabilities were consolidated under the NCC. Today the NCC is a large, standardized, integrated, high speed computing center with a computing environment that varies from workstations to a large IBM mainframe. Its mission is to support the Environmental Protection Agency in the areas of scientific, regulatory, and administrative applications. The NCC serves EPA customers and other qualified agencies and contractors through a telecommunications network which allows the distribution of computer services to remote locations. Along with hardware and software, and the means to communicate data, the NCC provides customer support and problem solving services.

Content: EPA's potentially contributing data to GCDIS result from a broad range of programs aimed at improving human and ecological health, assessing environmental risks, and preventing environmental pollution. Data from EPA's own programs, as well as data from programs delegated to the states, are stored in a variety of databases at the EPA NCC. These include data and information on: Ambient Air Quality, Source, Emissions, and Compliance; Ambient Water Quality, Source, Emissions, and Compliance; Hazardous and Solid Waste; Pesticides and Toxic Substances; and Cross-Program.

Access: The NCC supports different interfaces to each of its data systems. These, in turn, access various database management systems. No common interface, DBMS, or data dictionary exists, or is likely to exist in the short term. Data and information must be extracted into Envirofacts and normalized, before reasonable online public access will exist. The paradigm for which the interfaces and systems were developed is evolving from narrow "stovepipe" systems to more open, standardized systems with compatible data models.

Interfaces: Interfaces are internal to EPA and vary from data system to data system.

Standards: EPA adheres to appropriate Federal Information Processing Standards and Executive Orders in the operation of all its data and information facilities.

User Assistance: User advice and services are well-developed for internal users, but virtually non-existant for external users

Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	4	4	4
Browse	3	3	3
Order	4	4	4
Delivery	3	3	3

Organization: USEPA National Environmental Supercomputing Center, Bay City, MI

Data System: None

Description/Purpose: The National Environmental Supercomputing Center (NESC) at Bay City, Michigan, is the world's only supercomputer center devoted exclusively to environmental problems. The NESC supports EPA modeling efforts in regional air models, in large ecosystems such as the Chesapeake Bay and Great Lakes, and in computational chemistry for the study of toxics. The NESC also supports modeling activities related to the effects of climate change on terrestrial ecosystems. The NESC provides EPA programs with the ability to simulate environmental systems via mathematical models too large to be executed on conventional computers. Its role in GCDIS will be to provide a vehicle for processing environmental models and remote sensing data to create information supporting both research and policy formulation.

Content: The NESC is a supercomputing facility, rather than a repository for primary data. However, the NESC does maintain the results of models of potential interest to global change researchers: process models of ecosystems such as the Chesapeake Bay and Great Lakes, models of the effects of pollutants on human and ecological health, and models describing regional tropospheric ozone and acid deposition. At this writing, no basic policy has been set by EPA regarding the retention or dissemination of these model results.

Access: Access to the NESC is granted to EPA project participants and cooperative partners outside the Agency, based on proposals for supercomputer use. These projects are ranked and allocated supercomputer time based on scientific merit and Agency priority. Anonymous FTP has been discussed, but not yet approved.

Interfaces: The NESC interfaces to authorized users through a T-3 line between the NESC and the NCC. No public interfaces are available.

Standards: EPA adheres to appropriate Federal Information Processing Standards and Executive Orders in the operation of all its data and information facilities.

User Assistance: User advice and services are available only for holders of valid accounts.

Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	4	4	4
Browse	3	3	3
Order	3	3	3
Delivery	3	3	3

Organization: USEPA Public Access Servers, Research Triangle Park, NC

Data System: Envirofacts, Gopher, WWW, OLS

Description/Purpose: The EPA portion of GCDIS will consist of components accessible over the INTERNET via UNIX public access servers at RTP, NC. The public access servers are being developed as part of EPA's general strategy to increase access to all its environmental data and includes efforts from the focused USGCRP, as well as other areas. Extractions from selected Program databases will be made available as part of the *Envirofacts* database. The Servers will support INTERNET search tools (such as Gopher, WAIS, and Mosaic), and contain both data and pointers to data and information.

Content: *Envirofacts* is planned to contain extractions from the program databases to be made available to the public. *Envirofacts* currently contains pollutant <u>source</u> information from EPA's Facility Index System (FINDS), Permit Compliance System (PCS), Toxic Release Inventory System (TRIS), Resource Conservation and Recovery Act Information System (RCRIS), and theComprehensive Environmental Response, Compensation, and Liability Act (Superfund) Information System (CERCLIS). It the near future, it is scheduled to include the new STORET water monitoring database, and work is proceeding on incorporating the AIRS (Air and Radiation data and information) databases by the end of FY 1995. Additional programmatic and monitoring databases will be included in the future.

Access: WAIS, gopher.epa.gov, ftp.epa.gov, http://www.epa.gov,
Dialup 919-558-0335 (300-9,600 baud - Gopher only)

Interfaces: The *Envirofacts* database architecture and structure is currently supported by Version 7.0 of the ORACLE RDBMS and is available on line through the Public Access Server beginning on March 31, 1995. Directory search is possible through the use of WAIS software or the CIESIN Catalog System. Browse and delivery are available on line over the Internet through SQL commands in the ORACLE RDBMS. Limited browse and extraction functions are available and planned through a spatial Gateway and WWW tools. However for full functionality, the user must be familiar with ORACLE commands to browse and extract the data. There are currently no user charges for using this system.

Standards: Z39.50, Gopher, WWW/html, FTP, Telnet, and appropriate FIPS

User Assistance: No public user telephone or on line assistance is available during the initial 90 days of operation. Electronic user comments and feedback are solicited as part of the WWW pages. They are forwarded to appropriate program managers for response. Future user assistance implementation is dependent on availability of funds.

Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	2	2	2
Browse	2	2	2
Order	1	1	1
Delivery	1	1	1

Organization: USEPA/Office of Information Resources Management/EPA Library Suystem

Data System: On Line Library System

Description/Purpose: Online Library System (OLS), resides on the IBM mainframe under TSO, located at the National Computer Center, Research Triangle Park, North Carolina. OLS is a bibliographic database which references the information resources maintained by the EPA Library Network.

Content: OLS contains bibliographic citations from books, EPA and other federal agencies technical reports, conference proceedings, indexes, audiovisual materials, maps, journals and a variety of other documents held in the collections of EPA Headquarters, Regional and Laboratory Libraries. OLS also provides abstracts of selected titles. OLS contains the following related databases: Hazardous Waste Superfund Collection Database, Environmental Finance and Information Network (EFIN), National Center for Environmental Publications and information (NCEPI) and Regional Files from certain EPA Regional libraries.

Access: OLS may be accessed through several methods. Dialing in with a modem, telnet to INTERNET address or through the EPA Public Access Server. EPA staff may access OLS through two additional methods, the SNA Gateway and through the NCC data switch. OLS is compatible with most telecommunication software packages.

Dial In: (919) 549-0720; "IBMPSI"/"OLS"/"A"; (300-9600 baud; even parity; 1/2 duplex; 7 databits; 1 stop)

INTERNET: epaibm.rtpnc.epa.gov ; "Public Access"/"OLS"/"A"

The EPA Public Access Gopher site; gopher.epa.gov

Interfaces: The OLS interfaces with the Public Access Server and the EPA Libraries.

Standards: OLS is written in BASIS and is currently migrating to BASIS Plus. The operating system is IBM MVS/TSO. The software for OLS is BASIS and it resides on an IBM ES9000.

User Assistance: OLS provides help screens which list the 28 EPA Libraries and Program Office for each database. The help screens also provide assistance in developing search strategies. There are several levels of user support. EPA's National Computer Center provides support for technical system assistance . For information about the system users can contact the EPA National Library Network Program Manager. User guides and brochures may be obtained from the EPA Public Information Center. Librarians at the 28 EPA Libraries respond to questions on how to search the database.

Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	2	2	2
Browse	4	4	4
Order	3	3	3
Delivery	3	3	3

National Aeronautics and Space Administration

Global Change Data and Information System

Implementation Plan

April 1995

Table of Contents

1.0   Executive Summary

This document defines NASA's contribution to the Global Change Data Information System. The plan covers a three year period and includes the management infrastructure that directly supports the GCDIS development. The plan describes NASA's data and infrastructure contributions to the GCDIS.

NASA consists of several organizations or codes, each dedicated to a specific discipline. Code Y, the Office of Mission To Planet Earth (MTPE), leads all of NASA's research and development related to the Earth sciences, and global change in particular. The Office of MTPE has given the Goddard Space Flight Center (GSFC) overall responsibility for implementing the individual programs. The Earth Observation System (EOS) is NASA's biggest program in the Office of MTPE. The EOS satellites will provide a minimum of 15 years of comprehensive, global environmental data starting with the first launch in 1998.

NASA's primary contributions to the GCDIS are the EOS Data Information System (EOSDIS)and the GCMD. A single, distributed system, EOSDIS will provide easy and reliable access to Earth science data from EOS satellites, other MTPE satellites, joint programs with international partners and other agencies, field studies, and past satellites. The Global Change Master Directory provides directory access to multiple data sets located at may data centers, within and outside of NASA.

Other contributions include the Pathfinder program, the Crustal Dynamics Data Information System (CDDIS), Scientific and Technical Information (STI) program, and several NASA libraries. The Pathfinder provides access to large remote-sensing data sets prior to the availability of EOS data. From these long time series of global and regional data sets, higher level geophysical products will support US Global Change Research Program (USGCRP) objectives. The Pathfinder program makes research-quality global change data sets easily available to the science community. The STI Program builds and maintains a database of bibliographic records covering technical reports and articles received from NASA, other federal agencies, foreign exchange agreements, journals, and conferences. CDDIS distributes Earth dynamics, tectnophysics, and earthquake mechanism information and data products. Several of NASA's libraries contain articles, papers, and books related to global change.

2.0 Purpose and Scope

This document defines NASA's contribution to the Global Change Data Information System. It will define how NASA will integrate its data systems into the GCDIS. The plan will cover a period of three years. The plan will include the management infrastructure that directly supports the GCDIS development. The plan shall describe the technical content, budget and schedule for development of the elements contributed to GCDIS.

3.0 Agency Overview

NASA consists of several organizations or codes, each dedicated to a specific discipline. Code Y, the Office of Mission To Planet Earth (MTPE), leads all of NASA's research and development related to the Earth sciences, and global change in particular. Code Y at NASA Headquarters controls the overall research and development strategy, budget, and policy. NASA has nine space flight and research centers scattered across the United States (See Figure 1). The Office of MTPE has given the Goddard Space Flight Center (GSFC) overall responsibility for implementing its programs. Through GSFC, the other centers build instruments or satellites and process data for the MTPE.

The Earth Observation System (EOS) is the biggest program in the Office of MTPE. The EOS satellites will provide a minimum of 15 years of comprehensive, global environmental data starting with the first launch in 1998. The EOS Program also includes the EOS Data Information System (EOSDIS). A single, distributed system, EOSDIS will provide easy and reliable access to Earth science data from EOS satellites, other MTPE satellites, joint programs with international partners and other agencies, field studies, and past satellites. The EOS program also funds the Global Change Master Directory and the Pathfinder Data program.
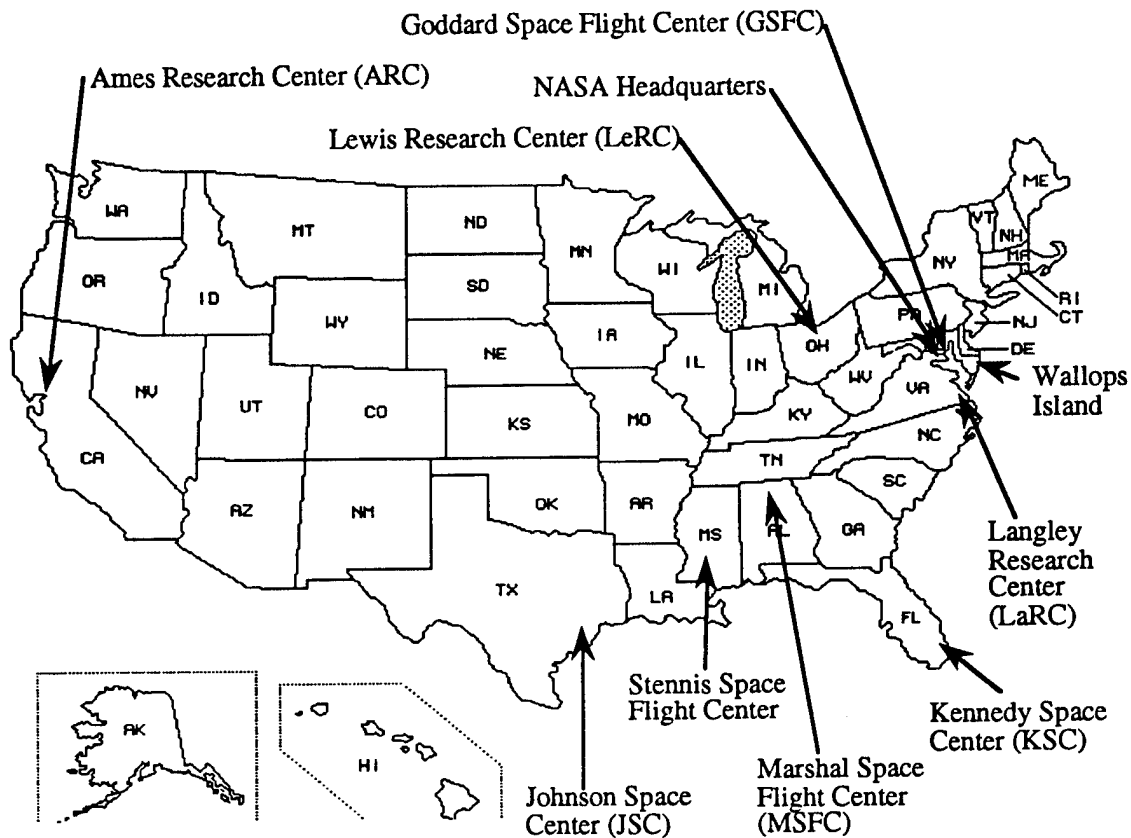
Figure 1: Major NASA Centers

4.0 Agency Data and Information Management

4.1. Management Structure

The Office of MTPE, located at NASA Headquarters, provides overall program management for all of the MTPE programs that contribute to GCDIS. The Office of MTPE delegates the actual implementation of its programs to the EOS Project Office, located at the GSFC. In turn, the EOS Project Office delegates work to contractors, researchers, other GSFC organizations, or other NASA centers. Figure 2 illustrates the basic management structure for EOSDIS.

EOS actually consists of many smaller programs. Consequently, the Office of MTPE and the EOS Project Office also consists of several smaller offices. Within the Office of MTPE at Headquarters, the Operations, Data, and Information Systems division oversees all development work related to GCDIS. Within the EOS Project Office at GSFC, the Earth Science Data and Information System Project Office manages all development work related to GCDIS.

The Office of MTPE defines basic program objectives, policy, design requirements, schedule, and budget. The Office of MTPE acts as the liaison between NASA and other Federal agencies, international organizations, Congress, and the White House. The EOS Project Office manages the program budget and schedule within the limits defined by the Office of MTPE. The EOS Project Office formulates all of the detailed requirements and

analysis, handles all contract negotiations and oversight, and performs testing and integration. The funds and oversight of work delegated to other GSFC organizations or NASA centers comes from the Project Office.

4.2.   User Advisory Process

NASA receives advice and criticism on its global change research program through the EOS advisory structure. Although the other NASA nodes have advisory structures, none are dedicated to global change. The EOS advisory structure consists of a hierarchy of panels, working groups, and focus teams, shown in Figure 2. These advisory groups provide guidance on instrument and product selection, program policy, and system design to various levels of management. Each advisory group has a similar purpose, but varies in scope. Essentially, the lower in the hierarchy, the narrower the scope. Figure 2 illustrates the advisory structure for EOS.

4.3.   Budget

Figure 3 summarizes the portion of NASA's budget that directly contributes to global change research. The budget summary focuses on money devoted to management of global change data and information and does not reflect satellite development costs. The budget summary excludes those nodes whose primary function is not global change research, even if they contribute relevant data and information.

The budget summary includes money donated for tasks that directly support GCDIS development. The Secretariat task covers all general support for all GCDIS meetings and documentation. It also includes all systems integration between the participating agencies and between the subgroups for the Interagency Working Group for Data Management for Global change. NASA also partially contributed to the Assisted Search for Knowledge (ASK) pilot project. The ASK pilot is investigating a thesaurus based search engine for GCDIS.

4.4.   Schedule

Figure 4 outlines the development schedule for nodes that directly contribute to global change research. The schedule summary focuses on major milestones related to management of global change data and information. The schedule does not include satellite development milestones. The schedule also excludes those nodes whose primary function is not global change research.

NASA released EOSDIS Version 0 in September, 1994. NASA plans 3-4 updates per year to Version 0 until the release of Version 1. NASA will release it largest contribution to GCDIS, EOSDIS Version 1, in January, 1996. NASA will release Version 2 in September, 1997. The Global Change Master Directory will have approximately two major updates per year. The other NASA nodes will not have any releases that directly affect the GCDIS.
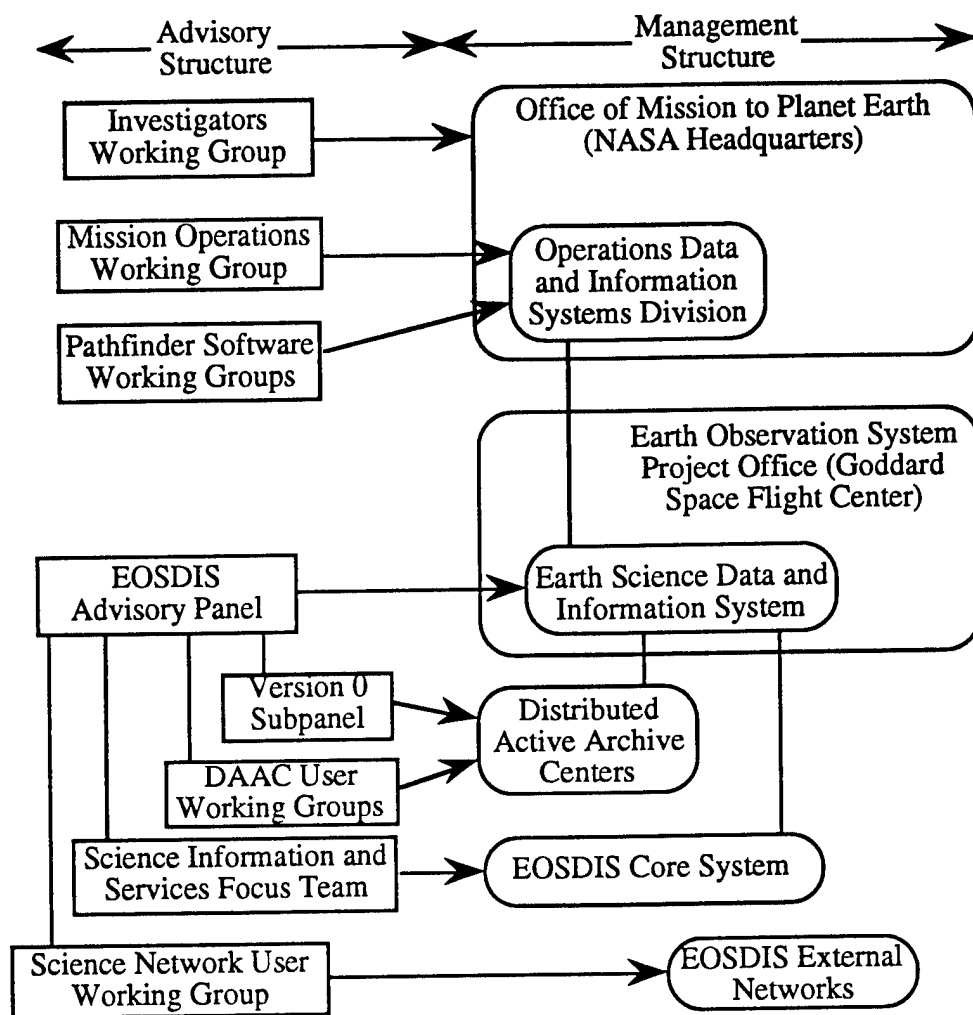
Figure 2: EOS Management and Advisory Structure

Node Name	FY 1995 ($M)	FY 1996 ($M)	FY1997 ($M)
EOSDIS, DAACs, etc.	185.76	253	265.1
GCMD	0.600	0.600	0.600
Secratariat	0.400	0.400	0.400
ASK	0.139	0.000	0.000
Pathfinder	6.00	6.20	6.20
Total OMTPE	192.900	260.200	272.300

Figure 3: Budget Summary for NASA's contribution to GCDIS

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.
GCMD Version 3	Mar. 1995	DIF autotransfer; DIF tools; WAIS search engine; geographic search on X-client; WWW upgrades
GCMD Version 4	Sep. 1995	Distributed database prototype; multiple data formats; geographic query; FGDC standard
GCMD Version 5	Mar. 1996	Thesaurus search engine; distributed server; WAIS search engine; geographic query
NASA STI NRIS	Jan. 1996	Release of NASA Research Information Service (NRIS) to replace RECON
EOSDIS Version 0	Sep. 1994	Release of EOSDIS Version 0, integrating 15 existing systems spread across 8 of the 9 Distributed Active Archive Centers.

Figure 4: Schedule Summary for NASA's contribution to GCDIS

5.0   System Description

5.1.   System Overview

NASA will integrate existing and proposed systems to provide GCDIS with access to global change related data. NASA will contribute three systems solely dedicated to global change research: the Earth Observation System Data Information System (EOSDIS), the Global Change Master directory (GCMD), and the Pathfinder Data Server. NASA will also contribute other systems whose collections include some data and information related to global change research: the NASA Science and Technical Information (STI) Program, and the Crustal Dynamics Data Information System (CDDIS). NASA will also contribute relevant information contained in four of its libraries. Lastly, NASA will contribute smaller systems that contain data relevant to global change research. NASA will integrate all of these systems in phases, starting from simple connectivity to full search access.

5.2   Earth Observation System Data Information System (EOSDIS)

5.2.1.   Description and Purpose

The EOSDIS provides the operational ground infrastructure for all satellites and instruments within the Mission To Planet Earth office at NASA. This includes the entire suite of Earth Observation System satellites, Landsat, and a dozen or so instruments on various satellites and the Shuttle. EOSDIS offers integrated access, search, and ordering of high volume satellite data sets from multiple data centers. EOSDIS includes mission operations and control as well as data production, archive, and distribution. Figure 5 illustrates the basic elements of the EOSDIS. Section 5.2 of this plan will focus general EOS and EOSDIS information. The nine Distributed Active Archive Centers within EOSDIS will appear under separate node descriptions.

The Science Computing Facilities generate the software algorithms that transform the raw satellite data into useful products. Each Instrument on each satellite will have one or more Science Computing Facilities, about 60 in all. The Science Data Processing Segment (SDPS) handles all data production archival, and distribution. The Flight Operations Segment (FOS) supports the simultaneous operation of EOS satellites and instruments. The Communications and Systems Management Segment (CSMS) manages schedules and operations among the DAACs and other elements of the EOSDIS. This includes data production, scheduling, network communication, payment, accounting, and billing. The EOSDIS Data and Operations System (EDOS) handles all telemetry to and from the satellite and performs the initial data processing. The EOSDIS Communications (Ecom) network sends commands to the Data Interface Facility for transmission to the satellite and distributes data from the satellites to the various archive and production facilities.

The Distributed Active Archive Centers (DAACs) serve as the interface between EOSDIS and the user community. Each DAAC concentrates on a specific discipline of global change and earth science research. EOSDIS has nine DAACs, shown in Figure 6. The DAACs process the raw data received from the satellites into usable products. They then distribute the products to the user community on a variety of media, such as magnetic tape or CD ROM. Users query DAAC content through the Internet. The DAACs provide all of the necessary software, documents, and help services to the users. For clarity, each DAAC will appear under a separate GCDIS node description.
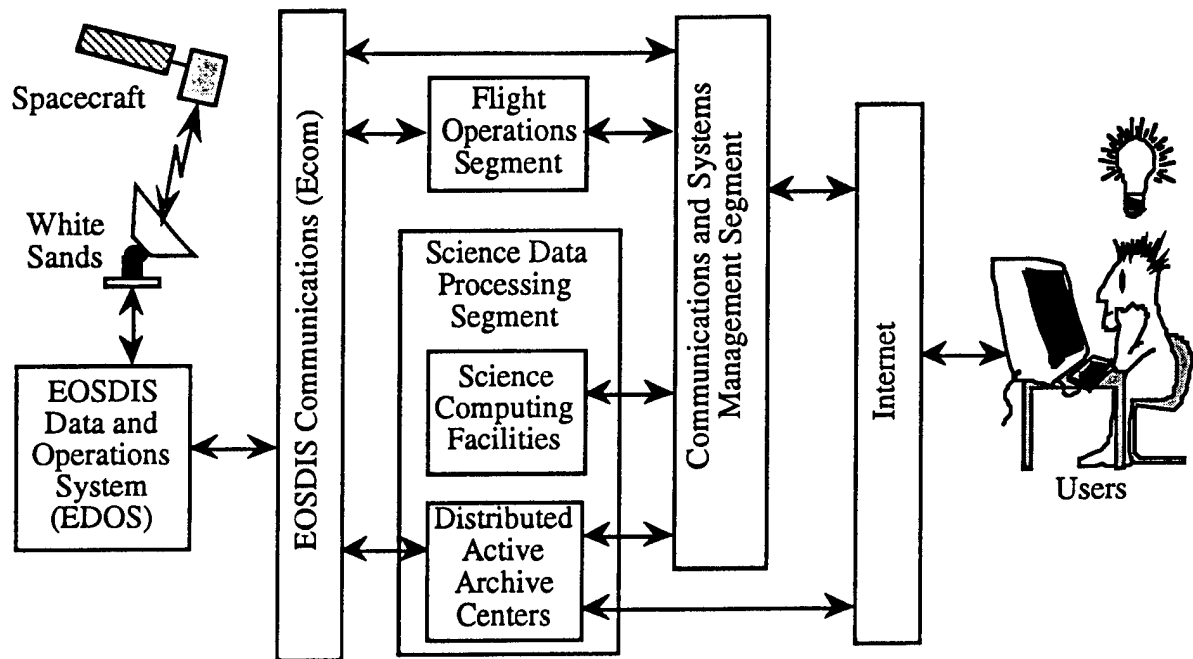
Figure 5   Primary Elements of the EOSDIS

National Snow and Ice Data Center (Earth's cryosphere)

EROS Data Center (Land processes)

Socioeconomic Data Archive Center (Socioeconomic environmental interactions)

Goddard Space Flight Center (Upper atmosphere, atmosphere dynamics, global biosphere)

Jet Propulsion Lab (Ocean circulations, air-sea interactions)

Alaska Synthetic Aperature Radar (SAR) Facility (Sea ice and polar processes)

Marshal Space Flight Center (Hydrologic cycle)

Oak Ridge National Lab (Biogeochemical dynamics)

Langley Research Center (Radiation budget, aerosols, tropospheric chemistry)

Figure 6   Distributed Active Archive Centers of EOSDIS

5.2.2.   Content

EOSDIS will provide access to data from the Tropical Rain Measurement Mission (TRMM), the Ocean Topography Experiment (TOPEX/Poseidon), the Upper Atmosphere Research Satellite (UARS), Total Ozone Mapping Spectrometer (TOMS), and Sea-Viewing Wide-Field of View Sensor (SeaWiFS). EOSDIS will include data from international missions in which NASA participates, such as the NASA Scatterometer (NSCAT) on Japan's Advanced EOS, the European Remote-Sensing Satellites (ERS–1 and ERS–2), Japan's Earth Resources Satellite (JERS–1), and Radarsat with Canada. Through EOSDIS, users can access data from field campaigns, such as the Boreal Ecosystem–Atmosphere Study (BOREAS), the Oregon Transact Ecosystem Research (OTTER), and the First International and Land Surface Climatology Project (ISLSCP) Field Experiment (FIFE). Users can also obtain data from satellites operated by other agencies, such as the NOAA's AVHRR, TOVS, and GOES satellites. Lastly, EOSDIS

will include existing data sets from past NASA missions and programs. Each DAAC manages the data sets specific to its discipline.

5.2.3. Access

Users can access the EOSDIS via the internet with telenet. Each DAAC hosts a both a server and a client. A user accesses EOSDIS remotely through one of the clients or copies the client onto his own computer and accesses the EOSDIS directly. EOSDIS offers a Graphical User Interface (GUI) and a Character User Interface (ChUI). The GUI offers data search, order, and visualization. The ChUI offers data search and order, but not visualization. Accessing the GUI client requires a computer that runs UNIX or can emulate X-Windows. If the user chooses to host the GUI client, he requires a UNIX-based computer. Accessing or hosting the ChUI client only requires VT100 emulation capability. Users can access all nine DAACs through these addresses.

WWW: http://eos.nasa.gov/

Gopher:

Type=1

Name=Earth Observation System Data Information System (EOSDIS)

Path=1/EosDis-User-Information/EOSDIS

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
EOSDIS	1	X	X		X	
EOSDIS	2	X	X	X	X	X
EOSDIS	3	X			X	
EOSDIS	4	X				X

5.2.4. Interfaces

EOSDIS will interface with GCDIS via internet using Gopher and Mosaic. The GCDIS Gopher and Mosaic will directly link, via telenet, to EOSDIS Version 0. EOSDIS will also link directly to the Assisted Search for Knowledge prototype. EOSDIS Version 0 already links directly to Global Change Master Directory (GCMD) and NOAA Satellite Active Archive.

The EOSDIS program will develop an interoperability tool kit to link EOSDIS directly to other data systems. The tool kit will allow existing data systems to link directly to the EOSDIS. The data systems would maintain existing data formats and protocols. However, the link will allow EOSDIS users to query the system for data. EOSDIS would display search results from multiple data centers to the user in a common format. The users would see the systems act as one, but the developers would maintain independence.

5.2.5. Standards

EOSDIS allows any data format, but uses the Hierarchical Data Format, developed by the National Center for Supercomputing Applications, as the standard. The standard language for production algorithms are FORTRAN and C++. The Server and client use UNIX as a standard.

5.2.6. User Assistance

Each DAAC maintains a help desk providing basic user services. The help desks find data, fill orders, and track statistics. The help desks can also solve problems associated with the user's local environment, such as system settings, UNIX emulation, network access, etc. A User Services Working Group assures consistency and communication across all DAACs.

EOSDIS maintains a general users guide. EOSDIS Version 0 access the users' guide via an on-line help system. Users can also obtain electronic versions of the user's guide over the internet via anonymous FTP, Gopher, and WWW. If desired, a user can obtain a paper copy of the User's Guide though the mail via any one of the DAAC help desks.

5.2.7. Implementation Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.3 Alaska Synthetic Aperture Radar (SAR) Facility (ASF) DAAC

5.3.1. Description and Purpose

Alaska Synthetic Aperture Radar (SAR) Facility (ASF) DAAC specializes in sea ice and polar processes for EOSDIS. ASF is located outside Fairbanks, Alaska.

5.3.2. Content

DAAC	Data Type	Vol (GB)	Remarks
ASF	MSS, TM Image Data	Analog	From Landsat series; analog data only
ASF	AHAP	Analog	NASA High Altitude Aerial Photography; analog data only
ASF	AVHRR Image Data	Analog	From NOAA series; analog data only
ASF	ERS–1 SAR Signal Data	15,500	Raw Level-0 data; distribution restrictions apply
ASF	ERS–1 SAR Level-1 Data	3,356	Level-1 data; distribution restrictions apply

5.3.3. Access

WWW: http://eosims.asf.alaska.edu:12355/asf_homepage.html

Version 0 Telnet: : eosims.asf.alaska.edu 12345

Gopher:

Type=1

Name=EOSDIS: Alaska Synthetic Aperture Radar (SAR) Facility (ASF)

Path=1/EosDis-User-Information/EOSDIS/DAACs/ASF

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: ASF	1	X	X		X	
DAAC: ASF	2	X	X	X	X	X
DAAC: ASF	3	X			X	
DAAC: ASF	4	X				X

5.3.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.3.5. Standards

All DAACs adhere to the Object Definition Language (ODL) standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is Hierarchacal data Format (HDF).

5.3.6. User Assistance

ASF DAAC User Services

Alaska SAR Facility

University of Alaska

PO Box 757320

Fairbanks, AK 99775-7320

Phone: 907-474-6166

FAX: 907-474-5195

NASA GCDIS Implementation Plan

Email: asf@eos.nasa.gov

5.3.7.   Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.4   EROS Data Center (EDC) DAAC

5.4.1.   Description and Purpose

EROS Data Center (EDC) DAAC specializes in land processes for EOSDIS. Jointly funded with the United States Geological Survey, EDC is located in Sioux Falls, South Dakota.

5.4.2.   Content

DAAC	Data Type	Vol (GB)	Remarks
EDC	Landsat MSS, TM	81,821	Some data available as film product only; subject to commercial restrictions
EDC	AVHRR LAC and HRPT	4,100	1 km, digital data
EDC	NDVI	30	AVHRR based, periodic composites
EDC	Airborne Sensor Data	197	USGS SLAR and several NASA sensors
EDC	Air and Space Photography	Analog	Approximately 10.4 million photos
EDC	DEM/DLG Data	1	USGS and CIA data sets
EDC	NURE Data	125	U. S. uranium resource potential

5.4.3.   Access

WWW: http://sun1.cr.usgs.gov/landdaac/landdaac.html

Version 0 Telnet: : eosims.cr.usgs.gov 12345

Gopher:

Type=1

Name=EOSDIS: Earth Resources Observation System (EROS) Data Center (EDC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/EDC

Host=eos.nasa.gov

Port=70

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Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: EDC	1	X	X		X	
DAAC: EDC	2	X	X	X	X	X
DAAC: EDC	3	X			X	
DAAC: EDC	4	X				X

5.4.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.4.5. Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.4.6. User Assistance

EDC DAAC User Services

U.S. Geological Survey

EROS Data Center

Sioux Falls, SD 57198

Phone: 605-594-6116

FAX: 605-594-6589

Email: edc@eos.nasa.gov

5.4.7. Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.5 Goddard Space Flight Center (GSFC) DAAC

5.5.1. Description and Purpose

Goddard Space Flight Center (GSFC) DAAC specializes in the upper atmosphere, atmospheric dynamics, the global biosphere for EOSDIS. GSFC is located in Greenbelt, Maryland, just outside Washington, DC.

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5.5.2. Content

DAAC	Data Type	Vol (GB)	Remarks
GSFC	Land Biosphere	52	AVHRR Land Pathfinder; dailies & composites
GSFC	Ocean Biology	757	CZCS archive; currently being integrated into DAAC system
GSFC	Upper Atmosphere	48	UARS and TOMS L3 data products
GSFC	Atmospheric Dynamics	145	TOVS Pathfinder, 4-D Assimilation, TOGA-COARE
GSFC	Heritage Climate/Land	1	Data sets transition from former NCDS (mostly GEDEX) and PLDS data systems

5.5.3. Access

WWW: http://daac.gsfc.nasa.gov/DAAC_DOCS/gdaac_home.html

Version 0 Telnet: : eosims.gsfc.nasa.gov 12345

Gopher:Type=1

Name=EOSDIS: Goddard Space Flight Center (GSFC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/GSFC

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: GSFC	1	X	X		X	
DAAC: GSFC	2	X	X	X	X	X
DAAC: GSFC	3	X			X	
DAAC: GSFC	4	X				X

5.5.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.5.5. Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.5.6. User Assistance

Goddard DAAC User Services

NASA Goddard Space Flight Center

Code 902.2

Greenbelt, MD 20771

Phone: 301-286-3209

FAX: 301-286-1775

Email: gsfc@eos.nasa.gov

5.5.7. Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.6 Jet propulsion Lab (JPL) DAAC

5.6.1. Description and Purpose

Jet propulsion Lab (JPL) DAAC specializes in ocean circulation and air-sea interactions for EOSDIS. JPL is located in Los Angelas, California.

5.6.2. Content

DAAC	Data Type	Vol (GB)	Remarks
JPL	TOPEX/Poseidon	122.9	Sensor data record and geophysical parameters
JPL	Nimbus–7 SMMR	0.6	Reprocessed brightness temperature and products
JPL	NOAA AVHRR / MCSST	6814	Oceans Pathfinder and Univ. of Miami multi-channel SST
JPL	CZCS and AVHRR CD-ROM	3	Combined pigment concentration and SST
JPL	Altimeter Data	7	Geophysical parameters from Geosat and GEOS-3
JPL	Seasat Data	97.3	Raw data and derived products from the Seasat Altimeter, Scatterometer, SMMR, and VIRR
JPL	DMSP SSM/I	22.8	Geophysical parameters
JPL	Supporting Data	7.1	Geophysical parameters

5.6.3. Access

WWW: http://podaac-www.jpl.nasa.gov/

Version 0 Telnet: : eosims.jpl.nasa.gov 12345

Gopher:

Type=1

Name=EOSDIS: Jet Propulsion Laboratory (JPL)

Path=1/EosDis-User-Information/EOSDIS/DAACs/JPL

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: JPL	1	X	X		X	
DAAC: JPL	2	X	X	X	X	X
DAAC: JPL	3	X			X	
DAAC: JPL	4	X				X

5.6.4.   Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.6.5.   Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.6.6.   User Assistance

JPL DAAC User Services

Jet Propulsion Laboratory

Mail Stop 300-320

4800 Oak Grove Drive

Pasadena, CA 91109

Phone: 818-354-9890

FAX: 818-393-2718

Email: jpl@eos.nasa.gov

5.6.7. Schedule

5.7 Langley Research Center (LaRC) DAAC

5.7.1. Description and Purpose

Langley Research Center (LaRC) DAAC specializes in radiation budget, aerosols, and tropospheric chemistry for EOSDIS. LaRC is located near Norfolk, Virginia.

5.7.2. Content

DAAC	Data Type	Vol (GB)	Remarks
LaRC	ERBE Level-0 Data and Products	426	Data from ERBS, NOAA–9,–10; ongoing
LaRC	ISCCP	239	Cloud analysis data
LaRC	SAM II and SAGE Data and Products	112	Data from Nimbus–7, AEM–2, ERBS; Nimbus–7 and ERBS; ongoing
LaRC	Surface Radiation	1	Processed short-wave Surface Radiation Budget (SRB) data sets; ongoing
LaRC	Field Experiments	325	GTE and FIRE data archives
LaRC	Additional Data	1	MAPS archives

5.7.3. Access

WWW: http://eosdis.larc.nasa.gov

Version 0 Telnet: : eosims.larc.nasa.gov 12345

Gopher:

Type=1

Name=EOSDIS: Langley Research Center (LaRC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/LaRC

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: LaRC	1	X	X		X	
DAAC: LaRC	2	X	X	X	X	X
DAAC: LaRC	3	X			X	
DAAC: LaRC	4	X				X

5.7.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.7.5.   Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.7.6.   User Assistance

Langley DAAC User Services

NASA Langley Research Center

Mail Stop 157B

Hampton, VA 23681-0001

Phone: 804-864-8656

FAX: 804-864-8807

Email: larc@eos.nasa.gov

5.7.7.   Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.8   Marshal Space Flight Center (MSFC) DAAC

5.8.1.   Description and Purpose

Marshal Space Flight Center (MSFC) DAAC specializes in the Earth's hydrologic cycle for EOSDIS. MSFC is located in Huntsville, Alabama.

5.8.2.   Content

DAAC	Data Type	Vol (GB)	Remarks
MSFC	SSM/I Antenna Temperatures	350	F8, F10, and F11 satellites from July 1987 through present in near real time (a few data gaps in early 1992). TOGA COARE subset available
MSFC	SSM/I Pathfinder Products (Level-2 swath)	36	Aug. 1987–Nov.. 1988 for water vapor, cloud water, rain rate, land surface temperature, and type

MSFC	MSU Temperatures with Limb90 correction	1	Jan 1979–present for monthly gridded (2.5°) lower and middle tropospheric, and lower stratospheric temperatures and daily zonal lower stratospheric temperatures
MSFC	MSU Pathfinder Path C1 Products	0.25	April 1987–Nov 1988 for daily, pentad, and monthly gridded (1°) global lower tropospheric and lower stratospheric temperatures and oceanic precipitation
MSFC	In situ Rainfall Observations	0.1	Ship and surface stations, both regional and global

5.8.3. Access

WWW: http://wwwdaac.msfc.nasa.gov/

Version 0 Telnet: : eosims.msfc.nasa.gov 12345

Gopher:

Type=1

Name=EOSDIS: Marshall Space Flight Center (MSFC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/MSFC

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: MSFC	1	X	X		X	
DAAC: MSFC	2	X	X	X	X	X
DAAC: MSFC	3	X			X	
DAAC: MSFC	4	X				X

5.8.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.8.5. Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.8.6.   User Assistance

MSFC DAAC User Services Office

977 Explorer Boulevard

Huntsville, AL 35806

Phone: 205-922-5932

FAX: 205-922-5723

Email: msfc@eos.nasa.gov

5.8.7.   Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.9   National Snow and Ice Data Center (NSIDC) DAAC

5.9.1.   Description and Purpose

National Snow and Ice Data Center (NSIDC) DAAC specializes in the Earth's cryosphere for EOSDIS. NIDC is located at the University of Colorado in Boulder, Colorado.

5.9.2.   Content

DAAC	Data Type	Vol (GB)	Remarks
NSIDC	DMSP SSM/I	70	Level-1.5 and Level-3 brightness temperatures; Level-3 ice extent and concentration (daily) and ice concentration (monthly)
NSIDC	Nimbus–7 SMMR	7	Level-3 brightness temperatures and sea-ice concentration
NSIDC	Geosat and Seasat altimetry data	15	Gridded elevations, height profiles, and wave form for Greenland and Antarctica
NSIDC	Nimbus–5 ESMR	3	Level-1.5 and Level-3 monthly and 3-day brightness temperatures and sea-ice concentration products (monthly)
NSIDC	AVHRR: Polar Subsets	120	Level-0 and swath data
NSIDC	LEADS: ARI	20	Level-3 AVHRR scenes
NSIDC	In situ data	1.9	Multiple source and data types

5.9.3.   Access

WWW: http://eosims.colorado.edu:1733/

Version 0 Telnet: : eosims.colorado.edu 12345

Gopher:

Type=1

Name=EOSDIS: National Snow and Ice Data Center (NSIDC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/NSIDC

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: NSIDC	1	X	X		X	
DAAC: NSIDC	2	X	X	X	X	X
DAAC: NSIDC	3	X			X	
DAAC: NSIDC	4	X				X

5.9.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.9.5. Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.9.6. User Assistance

NSIDC DAAC User Services

National Snow and Ice Data Center

CIRES, Campus Box 449

University of Colorado

Boulder, CO 80309-0449

Phone: 303-492-6199

FAX: 303-492-2468

Email: nsidc@eos.nasa.gov

5.9.7.   Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.10   Oak Ridge National Lab (ORNL) DAAC

5.10.1.   Description and Purpose

Oak Ridge National Lab (ORNL) DAAC specializes in biogeochemical dynamics for EOSDIS. Jointly funded with the Department of Energy, ORNL is located in Oak Ridge, Tennessee.

5.10.2.   Content

DAAC	Data Type	Vol (GB)	Remarks
ORNL	FIFE	0.15	Ground measurements and remotely sensed data from comprehensive study of radiation, moisture, and CO2 fluxes on Konza Prairie ecosystem in Kansas, USA, in 1987 and 1989.
ORNL	OTTER	15.15	Ground measurements and remotely sensed data from comparative study of carbon, nitrogen, and water fluxes in coastal, western-Cascades, and eastern-Cascades forests of Oregon, USA, 1988–1991.
ORNL	CDIAC	0.5	Atmospheric concentrations of methane and carbon dioxide; estimates of global, national, and regional CO2 emissions; long-term temperature records; historical data from ice cores; data for chloroflourocarbons and other trace gases

5.10.3.   Access

WWW: http://www-eosdis.ornl.gov/

Version 0 Telnet: : eosims.esd.ornl.gov 12345

Type=1

Name=EOSDIS: Oak Ridge National Laboratory (ORNL)

Path=1/EosDis-User-Information/EOSDIS/DAACs/ORNL

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: ORNL	1	X	X		X	
DAAC: ORNL	2	X	X	X	X	X
DAAC: ORNL	3	X			X	
DAAC: ORNL	4	X				X

5.10.4. Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.10.5. Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.10.6. User Assistance

ORNL DAAC User Services Office

Oak Ridge National Laboratory

PO Box 2008, Mail Stop 6407

Oak Ridge, TN 37831-6490

Phone: 615-241-3952

FAX: 615-574-4665

Email: ornl@eos.nasa.gov

5.10.7. Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.11 Socioeconomic Data Archive Center (SEDAC) DAAC

5.11.1. Description and Purpose

Socioeconomic Data Archive Center (SEDAC) DAAC specializes in socioeconomic data for EOSDIS. SEDAC, hosted by the Consortium for International Earth Science Information Network, is located at the University of Michigan in Saganaw, Michigan.

5.11.2. Content

DAAC	Data Type	Vol (GB)	Remarks
SEDAC	National Economic, Social and Environmental Data Bank	0.24	Information on Government resources available to businesses.
SEDAC	The UN Conference on Environment and Development Collection	0.016	Documents generated by the conference.
SEDAC	County Business Patterns	0.382	Detailed information on United States business and industries.
SEDAC	USA Counties: A Statistical Abstract Supplement	0.087	Demographic, economic, and governmental data taken from Census Bureau statistics.
SEDAC	Public Use Microdata Samples	1.403	United States census records for a sample of housing units.
SEDAC	March Current Population Survey Data, 1968–1992	0.308	Demographic survey of the civilian, non-institutionalized population of the United States.
SEDAC	Environmental Subset of Collection of Multilateral Conventions at the Fletcher School of Law Diplomacy	0.001	Text of selected international treaties and agreements important to the environment.
SEDAC	Economic Census	0.347	Information on the structure and functioning of the United States economy.
SEDAC	County and City Data Book, 1988	0.011	Demographic, economic, and governmental data.
SEDAC	Regional Economic Information System	0.492	Economic data and annual estimates of personal income.
SEDAC	Register of International Treaties	0.001	Information on environmental treaties agreements.
SEDAC	Hazardous Substance Release/Health Effects Data base (HazDat)	<0.001	Information on the release of hazardous substances.

5.11.3. Access

WWW: http://www.ciesin.org/SEDAC/SEDAC-home.html

Gopher:

Type=1

Name=EOSDIS: SocioEconomic and Applications Center (SEDAC)

Path=1/EosDis-User-Information/EOSDIS/DAACs/CIESIN

Host=eos.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
DAAC: SEDAC	1	X	X	X		
DAAC: SEDAC	2	X	X			
DAAC: SEDAC	3	X			X	
DAAC: SEDAC	4	X		X	X	X

5.11.4.   Interfaces

All DAACs interface with each other through EOSDIS Version 0 and the WWW. EOSDIS Version 0 will serve as the primary interface with GCDIS. Using the EOSDIS Graphical User Interface requires Unix emulation or a Unix machine. Using the EOSDIS Character User Interface requires VT-100 emulation. The unique local capabilities requires a WWW client.

5.11.5.   Standards

All DAACs adhere to the ODL standard required by EOSDIS Version 0. All DAACs adhere to Telnet, WWW, Gopher, and FTP protocols. The standard data format is HDF.

5.11.6.   User Assistance

5.11.7.   Schedule

Milestone	Date	Description
EOSDIS Version 1	Jan. 1997	Release of EOSDIS Version 1 to support the launch of the Tropical Rainfall Mapping Mission satellite in August, 1997.
EOSDIS Version 2	Oct. 1997	Release of EOSDIS Version 2 to support the launch of the AM-1 satellite in June, 1998.

5.12   Global Change Master Directory (GCMD)

5.12.1.   Description and Purpose

The Global Change Master Directory is a client-server software system, which incorporates a commercial database management package to provide directory level information on Earth science data sets to users (primarily researchers). The GCMD database holds more than 2800 high-level data set descriptions that give the user data set information. Data set information is stored in the database (Oracle) in Directory Interchange Format (DIF).

Users search on controlled fields within the database but can utilize the uncontrolled 'expert search' which targets general keywords in each entry, as well as the controlled fields. DIFs are submitted to the GCMD's discipline "coordinators", who quality-control submitted DIFs, as well as write DIFs for important data sets they identify. The value of the directory depends on current data set information, and the GCMD effort is committed to referencing data sets from as many available sources as possible. A software tool has been

developed to assist data providers in preparing and validating data set descriptions in DIF format.

For some data sets, the descriptions offer more detailed information - sometimes even the data are available through a LINK command to a remote site external to the system. If the LINK command appears highlighted when the entry is being viewed, an automatic telnet connection can be made, which links the user directly to an external data system.

A majority of U.S. federal agencies are represented by the data sets cited, as well as many foreign countries. The entire software system has been ported to countries around the world through the Committee on Earth Observation Satellites' International Directory Network (CEOS IDN). Database updates are exchanged through bimonthly database coordination procedures. Software upgrades are distributed periodically.

5.12.2. Content

The majority of data set descriptions in the GCMD are from the Earth sciences. At the present time, there are a total of 2831 entries; 2298 of these are from the Earth sciences - Atmosphere, Land, Ocean, and Interior/Crust; and 533 are from other disciplines including the Planetary Sciences, the Life Sciences, Astronomy, and Solar Physics. The GCMD contains data set descriptions from nearly all federal agencies including NASA, NOAA, USGS, EPA, DOE, and USDA, as well as from universities, private industry, and foreign agencies. The GCMD has descriptions of data being distributed through all of the EOSDIS DAACs, data from most of the NOAA agencies (NGDC, NCDC, NODC, etc.), unclassified DOD environmental data, and data from international programs such as IGBP, UNEP/GRID, and the CEOS IDN.

5.12.3. Access

Users can access the GCMD through the Internet using telenet or World Wide Web clients, such as Mosaic. The GCMD offers the user a variety of computer interfaces including an ASCII text interface (used primarily by the CEOS IDN nodes); a windows-like JAM interface (JAM is JYACC's Application Manger, a commercial package from JYACC) used in GCMD telnet sessions; an X-client interface; and a World Wide Web (WWW) interface using query forms and WAIS search capabilities.

The GCMD also provides a 1993 version for use on personal computers (both IBM and Macintosh). However, the most current version of the GCMD will always be on-line. The GCMD distributes copies of the PC version to developing countries through UNEP/GRID-Geneva.

WWW: http://gcmd.gsfc.nasa.gov/

Telnet: gcmd.gsfc.nasa.gov (login as "gcdir")

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
GCMD	1	X				
GCMD	2	X	X	X		
GCMD	3	X			X	
GCMD	4	X				X

5.12.4.   Interfaces

The GCDIS interfaces with the GCDIS through Gopher and Mosaic links. The GCMD interfaces with some of the other GCDIS systems directly with telenet, gopher, or mosaic links.

The GCMD has assumed responsibility for the Committee on Earth Observation Satellites' (CEOS) International Directory Network (IDN). Through the CEOS Working Group on Data, representatives from Canada, France, Germany, Italy, Japan, Argentina, Russia, and the United States have collaborated to provide information about their country's scientific data sets. This working group represents many agencies, universities, and other organizations within each country. The system of networked connections among the countries that offer and exchange data set information is called the CEOS IDN. Australia, Brazil, New Zealand, and possibly China will join the network in the coming years. The GCMD interfaces with the IDN by providing servers to international participants.

5.12.5.   Standards

Entries for the directory are submitted in the Directory Interchange Format (DIF), providing standardized information on parameters, geographic and temporal coverage's, data set providers, and other summary information that can be automatically loaded into the database. Work is in progress in cooperation with other federal agencies to assure that the DIF evolves to become compliant with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata in response to Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure" and the Government Information Locator Service (GILS).

5.12.6.   User Assistance

The GCMD operates a User Support office and hotline. The GCMD also provides tools and assistance in registering new data sets, interpreting DIF information, and maintaining existing DIF records. Each discipline has a dedicated GCMD representative.

The User support Office provides various publications about the GCMD and related activities. These publications include: Global Change Master Directory Bookmark, International Directory Network World Guide, Meteorological Information from the GCMD, User's Guide, Quick Reference Guide, DIF Manual, and DIF Writer's Guide. The GCMD also maintains anonymous ftp account containing the following documents: Directory Interchange Format (DIF) Manual, DIF Writer's Guide, System Documentation, Programmer's API, Operations Guide, Quick Reference Guide, GCMD Directory Valid Keywords List, User's Guide, and Context Passing Manual.

GCMD User Support Office

7701 Greenbelt Road, Suite 400

Greenbelt, MD 20770

Phone: 301-441-4202

FAX: 301-441-9486

Email: gcmduso@gcmd.gsfc.nasa.gov

5.12.7.   Schedule

March 1995: Deliver Version 3 of the GCMD and distribute the upgrade to the CEOS IDN nodes with the following: (1) operational version of the automated extractor for the autotransfer of DIFs to the CEOS IDN nodes, (2) operational version of UNIX-based DIF authoring tool for writing and editing DIFs, which incorporates loader to authoring tool, (3) operational version of WAIS, (4) the enchanced X client. The enhanced X client includes (a) geographic map query capability (b) function to use minimum bounding rectangles to delineate regions of interest [also for other clients] (c) expanded "go to" menu, which allows user to return to prior screens, (d) Mosaic text widgets (e) calls to Mosaic for documentation/help.

September 1995: Deliver Version 4 of the GCMD and distribute the upgrade to the CEOS IDN nodes with the following functionality: (1) prototype distributed GCMD (Phase I - in coordination with the Distributed Oceanographic Data System) database server, (2) extended WAIS functionality, (3) enhanced functionality of geographic query capability, recognizing the FGDC Content Standards for Digital Geospatial Metadata, and (4) support for multiple protocols.

Deliver Version 5 of the GCMD and distribute the upgrade to the CEOS IDN nodes with the following functionality: (1) prototype thesaurus interface to keywords, (2) operational distributed GCMD database server, (3) integrated WAIS functionality, and (4) integrated functionality of enhanced geographic query capability.

Ongoing work includes the writing and registration of data set descriptions in the GCMD, representing NASA through the Global Change Data and Information System (GCDIS), serving on the Federal Geographic Data Committee, and providing software and technical support to coordinate directory information internationally through the CEOS IDN.

5.13   NASA Science and Technical Information (STI) Program

5.13.1.   Description and Purpose

NASA's STI Program builds and maintains a database of bibliographic records covering technical reports and articles received from NASA, other federal agencies, foreign exchange agreements, journals, and conferences. The bibliography covers all areas of research and development of interest to NASA. RECON offers on-line access to the more than 2 million bibliographic records. The STI Program also builds and maintains a shared catalog of the holdings of NASA center's libraries, known as ARIN. The STI Program also maintains other searchable, on-line files describing NASA research contracts, NACA documents, and various other specialized fields of interest. The databases now reside on an IBM mainframe at the Center for AeroSpace Information (CASI) in Linthicum Heights, Maryland (south of Baltimore). An IBM RISC computer will eventually replace this mainframe and allow a client/server architecture.

5.13.2.   Standards

For telecommunications, RECON and ARIN use TCP/IP access (telnet, gopher, www) and IBM 3270 and VT100 emulation. RECON uses the COSATI record format and cataloging rules and ARIN uses the USMARC format and AACR2 cataloging rules. When RECONPLUS replaces RECON, both systems will use the USMARC record format. The database and retrieval software is BASISPlus (RECONPLUS), NOTIS (ARIN), WAIS (for portion of publicly available RECON documents). Compliance with NISO's Z39.50

standard for remote query will be implemented when available with BASISPlus and NOTIS.

5.13.3.   Interfaces

RECON and ARIN will interface with GCDIS via Gopher and Mosaic links. RECON and ARIN databases will link to other NASA Center's libraries through NASA's PSCN and NASAnet and through Internet (TCP/IP) connections.

5.13.4.   Content

Data includes bibliographic records that include abstracts and indexing based on NASA's Thesaurus. Subjects cover international aerospace research and development, including many aspects of global change research. The primary products include:

1.   On-line databases with retrieval software

2.   Full documents of referenced items available through document ordering.

3.   On-line ordering of documents and flexible payment options.

4.   WAIS access to most current years of publicly-available documents.

5.   Monthly printed bibliography of newly added records known as STAR.

6.   Biweekly SCAN listings of newly added records on specific topics available in electronic and printed versions.

7.   CD-ROM, known as ASTRO, containing five years of records for publicly available documents from the RECON database.

8.   NASA Thesaurus and subject category list.

5.13.5.   Access

Any computer workstation with access to Internet can access the on-line databases with freely available clients (Gopher, mosaic, etc. Recon and Aric support IBM 3270 and VT100 emulation.

WWW: http://www.sti.nasa.gov

Gopher:

Type=1

Name=Science and Technical Information (STI) System

Path=

Host=gopher.sti.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
NASA STI	1	X	X			
NASA STI	2	X		X	X	
NASA STI	3	X				X
NASA STI	4	X				

5.13.6. User Assistance

NASA Center for AeroSpace Information (CASI).

800 Elkridge Landing Road

Linthicum Heights, Maryland 21090-2934

Phone: (301) 621-0390.

E-mail: help@sti.nasa.gov

5.13.7. Schedule

The new RECONPlus system currently in development is based on client/server architecture. The initial client will be based on Microsoft Windows; the interface will be converted to Macintosh and UNIX using the XVT interface development software. ARIN is also being converted to client/server architecture. On-line access to the more than 2 million records is provided through RECON; Internet access is available. ARIN is accessible through Internet. The RECON replacement is scheduled to be operational in the beginning of 1996. At that time, all of the on-line services will be known as the NASA Research Information Service (NRIS). Both GUI and character-based interfaces will be supported with RECONPLUS when it is available in 1996.

5.14 Crustal Dynamics Data Information System (CDDIS)

5.14.1. Description and Purpose

The Crustal Dynamics Data Information System (CDDIS) distributes Earth dynamics, tectonophysics, and earthquake mechanism information and data products. CDDIS includes the results of science support groups analyzing these data sets. CDDIS consists of an on-line access system and an anonymous FTP server located at the GSFC.

5.14.2. Content

CDDIS products include precision baseline distances and velocities, Earth rotation and polar motion determinations, length-of-day values, and calculated three-dimensional station positions. CDDIS also has laser ranging data, both to artificial satellites and the Earth's moon, and Very Long Baseline Interferometry. CDDIS archives Global Positioning System data starting in 1990 for project-sponsored experiments as well as global networks.

5.14.3. Access

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Users can access CDDIS over the internet with telenet and VT100 emulation or directly via phone modem.

Telnet: cddis.gsfc.nasa.gov (login as "cddis")

ftp: cddis.gsfc.nasa.gov @/

Gopher:

Type=1

Name=Crustal Dynamics Data Information System (CDDIS)

Path=1/EosDis-User-Information/CDDIS

Host=eos.nasa.gov

Port=70

Modem:

Site	Phone Number	Baud Rate
ARC	(415) 604-7877	300 to 2400
ARC	(415) 604-7879	300 to 9600
GSFC	(301) 286-9000	300 to 2400, no parity
GSFC	(301) 286-9500	300 to 2400, even parity
GSFC	(301) 286-4000	9600, no parity
GSFC	(301) 286-4500	9600, even parity
JPL	(818) 393-6324	300 to 2400

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
CDDIS	1	X	X		X	X
CDDIS	2	X				X
CDDIS	3	X		X		
CDDIS	4					

5.14.4.   Interfaces

CDDIS will interface with the GCDIS via Gopher link and Mosaic link. The CDDIS will not interface directly with other nodes of GCDIS.

5.14.5.   Standards

The analysis results and products appear in uncompressed ASCII format. The Global Positioning System data products appear in compresses RINEX format. The ranging data appears in ASCII in CSTG or MERET II format. The data formats do vary between data sets. The CDDIS uses a UNIX operating system on a VAX 400, model 200 computer.

5.14.6. User Assistance

The CDDIS staff does both system development and user support. Consequently, they do not have a dedicated user support desk.

5.14.7. Schedule

5.15 Pathfinder Data Server

5.15.1. Description and Purpose

The Pathfinder supports global change research by providing access to large remote-sensing data sets prior to the availability of EOS data. From these long time series of global and regional data sets, higher level geophysical products will be derived to support US Global Change Research Program (USGCRP) objectives. The main goal of the Pathfinder program is to make research-quality global change data sets easily available to the science community.

The Pathfinder Data Server contains samples of the data sets which one day will be available for the entire Pathfinder project. The samples cover a single day, March 20, 1988, the Vernal Equinox. This sampler demonstrates the range of products available from the various Pathfinder instruments. The Pathfinder Data Server consists of a single File Transfer protocol (FTP) server located at NASA's Ames Research Center. the EOSDIS DAACs store the full Parthfinder data sets.

5.15.2. Content

Most of the pathfinder samplers span the entire globe. The sampler includes data and images on global water vapor, liquid water data, vegetation Index, cloud cover climatology, precipitation, sea surface temperature, surface radiation budget, sea ice, and winds. Table 1 lists the specific Pathfinder data products and the location of where EOS archives the full dataset.

Pathfinder	Product Available	Time Period	Temporal Resolution	DAAC
AVHRR Land	Global Land Data Set	1/86 - 12/89	Daily and 10-day Mosaics	GSFC
AVHRR Ocean	Global Ocean SST (pre-Pinetubo)	1987-1991	Daily	JPL
TOVS Path A	TOVS Products	12/86 - 7/88	Daily, 5-Day, Monthly	GSFC
TOVS Path B	TOVS Products (international collaboration)	TBD	TBD	GSFC
TOVS Path C1	Ocean Deep Mean Layer Temperatures	4/87 - 11/88 (Benchmark)	Daily, 5-Day, Monthly	MSFC
SSM/I	Antenna Temperatures	8/87 - 12/88	Satellite scan (orbit)	MSFC
SSM/I	Level 3 Gridded Temperature Brightness (No. Hemisphere)	4/87 - 11/88 (Benchmark)	Daily	NSIDC
SSM/I	Precipitation	8/87 - 11/88 (Benchmark)	Satellite scan (orbit)	MSFC
SSM/I	Atmospheric	8/87 - 11/88 (Benchmark)	Satellite scan (orbit)	MSFC
SSM/I	Marine Wind Speed	8/87 - 11/88 (Benchmark)	Satellite scan (orbit)	JPL
SSM/I	Sea Ice Concentration	8/87 - 12/92	Daily	NSIDC
Landsat	Land Products	TBD	TBD	EDC
Global 1Km	North America and Global land products	4/92 - 3/93	10-day Composites	EDC
ISCCP	C1 and C2 Data Products	1983 - 1991	3 hours , Monthly	LaRC

Table 2   Pathfinder Data Sets

5.15.3. Access

Users access the Pathfinder Data Server using Gopher, Mosaic, and other Internet clients.

WWW: NASA Pathfinder Home Page   http://xtreme.gsfc.nasa.gov/pathfinder/

WWW: Pathfinder Sampler   http://pathfinder.arc.nasa.gov

WWW: AVHRR global 1 KM   http://sun1.cr.usgs.gov/landdaac/landdaac.html

WWW: AVHRR Land   http://xtreme.gsfc.nasa.gov/

WWW: AVHRR Ocean   http://sst-www.jpl.nasa.gov/

WWW: AVHRR Ocean (Modelling)
http://biggles.gsfc.nasa.gov/~adamec/path_home_page.html

WWW: LANDSAT Land Cover
http://sun1.cr,usgs.gov/landdaac/pathfinder/pathpage.html

WWW: LANDSAT Global Land Cover Test Sites   http://glcts.maxey.dri.edu/glcts

WWW: SSM/I
http://wwwdaac.msfc.nasa.gov/userservices/pathfdr_ssmi_readme.html

WWW: TOVS C1   http://wwwdaac.msfc.nasa.gov/msu.html

Gopher:

Type=1

Name=Pathfinder Data Sets

Path=

Host=pathfinder.arc.nasa.gov

Port=70

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
Pathfinder	1	X				
Pathfinder	2	X		X		
Pathfinder	3	X	X		X	
Pathfinder	4					X

5.15.4. Interfaces

The Pathfinder Data Server will interface with the GCDIS via Gopher link and Mosaic link. The Pathfinder Data Server will not interface directly with other nodes of GCDIS.

5.15.5.   Standards

Almost all the sample Pathfinder images appear in Hierarchical Data Format (HDF), although some appear in GIF or TIF format. The full data sets use HDF.

5.15.6.   User Assistance

The Pathfinder Data Server does not offer dedicated user support services. Rather, the user refers to the help services provided by the EOSDIS program. The descriptions on the Pathfinder Data Server does reference the sources (including names and addresses) of the data sets.

5.15.7.   Schedule

A Pathfinder NASA Research Announcement, issued in December of 1994, will continue to rationalize and strengthen OMTPE's data product generation activities. A peer review will evaluate the technical and scientific merits of the proposals received in March of 1995. NASA will also review the proposals for relevance to the scientific and programmatic tresearch goals of the OMTPE and the USGCRP.

5.16   Ames Research Center Life Sciences Library

5.16.1.   Description and Purpose

This library caters to the information and technical needs of Ames Research Center's engineers, scientists, and managers.

5.16.2.   Content

The Ames Research Center Life Sciences Library is not dedicated to global change. However, it does contain books, articles, and technical papers related to global change.

Strong coverage: Atmosphere

Medium coverage: Land, Ocean, Environmental Change

Weaker coverage: Solid Earth Dynamics, Solar Radiation, Human Dimensions

5.16.3.   Access

NASA Ames Research Center

MS 239-13

Moffett Field, CA 94035-1000

Phone: (415) 604-5387

Fax: (415) 604-4988 or -3954

Email: esther.johnson@qmgate.arc.nasa.gov

http://www.arc.nasa.gov/Library/Libwelcome.html

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
ARC Life Science Library	1	X				
ARC Life Science Library	2	X				
ARC Life Science Library	3	X	X			
ARC Life Science Library	4	X	X	X	X	X

5.16.4. Interfaces

Ames Research Center Life Sciences Library will interface with other GCDIS nodes via the WWW.

5.16.5. Standards

Ames Research Center Life Sciences Library will adhere to WWW protocols.

5.16.6. User Assistance

Phone: (415) 604-5387

Email: esther.johnson@qmgate.arc.nasa.gov

5.16.7. Schedule

5.17 Goddard Space Flight Center Homer E. Newell Memorial Library

5.17.1. Description and Purpose

This library caters to the information and technical needs of Goddard Space Flight Center's engineers, scientists, and managers.

5.17.2. Content

The Homer E. Newell Memorial Library is not dedicated to global change. However, it does contain books, articles, and technical papers related to global change.

Strong coverage: Atmosphere, Ocean, Solid Earth Dynamics, Environmental Change

Medium coverage: Land, Solar Radiation

Weaker coverage: Human Dimensions

Special coverage: Remote Sensing

5.17.3. Access

NASA Goddard Space Flight Center

Code 252

Greenbelt, MD 20771

Phone: (301) 286-7218

Fax: (301) 286-1755

Email: library@ccmail.gsfc.nasa.gov

http://www-library.gsfc.nasa.gov

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
GSFC Newel Library	1	X				
GSFC Newel Library	2	X	X			
GSFC Newel Library	3	X				
GSFC Newel Library	4	X		X	X	X

5.17.4. Interfaces

The Goddard Space Flight Center Homer E. Newell Memorial Library will interface with other GCDIS nodes via the WWW.

5.17.5. Standards

The Goddard Space Flight Center Homer E. Newell Memorial Library will adhere to WWW protocols.

5.17.6. User Assistance

Phone: (301) 286-7218

Email: library@ccmail.gsfc.nasa.gov

5.17.7. Schedule

5.18 Jet Propulsion Laboratory Library

5.18.1. Description and Purpose

This library caters to the information and technical needs of Jet Propulsion Laboratory's engineers, scientists, and managers.

5.18.2. Content

The Jet Propulsion Laboratory Library is not dedicated to global change. However, it does contain books, articles, and technical papers related to global change.

5.18.3. Access

Jet Propulsion Laboratory

Oak Grove Drive

Pasadena, CA 91109-8099

Phone: (818) 354-4202

Fax: (818) 393-6792

Email: eric.l.hines@jpl.nasa.gov

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
JPL Library	1					
JPL Library	2					
JPL Library	3					
JPL Library	4	X	X	X	X	X

5.18.4. Interfaces

The Jet Propulsion Laboratory Library will not directly interface with other GCDIS nodes.

5.18.5. Standards

5.18.6. User Assistance

Phone: (818) 354-4202

Email: eric.l.hines@jpl.nasa.gov

5.18.7. Schedule

5.19 Langley Research Center Technical Library

5.19.1. Description and Purpose

This library caters to the information and technical needs of Langley Research Center's engineers, scientists, and managers.

5.19.2. Content

The Langley Research Center Technical Library is not dedicated to global change. However, it does contain books, articles, and technical papers related to global change.

5.19.3. Access

NASA Langley Research Center

MS 185

Hampton, VA 23665-5225

Phone: (804) 864-2356

Fax: (804) 864-2375

Email: tech-library@larc.nasa.gov

http://www.larc.nasa.gov/org/library/larc.lib.html

Node	Access Level	Connectivity	Search	Browse	Order	Delivery
LaRC Tech Library	1	X				
LaRC Tech Library	2	X	X			
LaRC Tech Library	3	X				
LaRC Tech Library	4	X		X	X	X

5.19.4.   Interfaces

The Langley Research Center Technical Library will interface with other GCDIS nodes via the WWW.

5.19.5.   Standards

The Langley Research Center Technical Library will adhere to WWW protocols.

5.19.6.   User Assistance

Phone: (804) 864-2356

Email: tech-library@larc.nasa.gov

5.19.7.   Schedule

5.20   Miscellaneous Data Systems

Various organizations and projects within NASA offer data and information useful to the GCDIS. Each organization or project characteristically focuses on the needs of a specific audience and contains a relatively small number of datasets. As available tools have improved, these organizations and projects have begun to connect to the Internet and offer on-line access to data and information. The sophistication of on-line access varies from simple Gopher servers to complete data systems. Describing each system in detail will add greatly to the volume, but not value, of this plan. Instead, this plan will focus on generic procedures to integrate these systems into the GCDIS.

First, NASA will periodically search the internet for NASA nodes that offer data relevant to GCDIS. NASA personnel will search the internet both manually and with freely available searching tools. These tools can search the internet domain of NASA for nodes that contain or match certain search parameters, such as a word or phrase. Since different search techniques often produce different results, NASA will use more than one search tool. As these tools mature, NASA will set up an a monthly or quarterly automated search of the NASA domain of the Internet. A comparison with the GCDIS pointer database will identify the new nodes.

Once identified, NASA will add the appropriate information to the GCMD. This information will include gopher, ftp, telenet, and mosaic pointers as well as the sponsoring agencies and topics. At this stage, the GCDIS will not need to strike a specific agreement with the organization or project that maintains the node. However, each organization will receive notification that the GCDIS has connected to their data server or system. The next release of the GCDIS will then include the gopher or Mosaic link to the new node. At this stage, GCDIS will have the simplest, and lowest, level of access to the data center.

Deeper access (e.g., the ability to seek and locate specific data sets or granules) requires greater connectivity to GCDIS. At this stage, NASA headquarters will strike an agreement with each system to set up the appropriate indices and interfaces to allow deeper search and access. The GCDIS Access Implementation Plan defines the details of granule level search and access. In all cases, each organization will maintain all required GCDIS data, tools, and software locally.

Appendix A   Acronym List

AEM	Application Explorer Mission
ARC	Ames Research Center
ASF	Alaska SAR Facility
ASK	Assisted Search for Knowledge
AVHRR	Advanced Very High Resolution Radiometer
BOREAS	Boreal Ecosystem–Atmosphere Study
BOREAS	Boreal Ecosystem–Atmosphere Study
CASI	Center for AeroSpace Information
CD ROM	Compact Disc Read Only Memory
CDDIS	Crustal Dynamics Data Information System
CDIAC	Carbon Dioxide Information and Analysis Center
CEOS	Committee on Earth Observation Satellites
ChUI	Character User Interface
CIA	Central Intelligence Agency
CSMS	Communications and Systems Management Segment
DAAC	Distributed Active Archive Center
DAAC	Distributed Active Archive Centers
DEM	Digital Elevation Mode;
DIF	Directory Interchange Format
DLG	Digital Line Graph
DMSP	Defense Meteorological Satellite Program
DOD	Department of Defense
DOD	Department of Defense
DOE	Department of Energy
ECOM	EOSDIS Communications
EDC	EROS Data Center

EDOS	EOSDIS Data and Operations System
Email	Electronic Mail
EOS	Earth Observation System
EOSDIS	Earth Observation System Data Information System
EPA	Environment Protection Agency
EPA	Environmental Protection Agency
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Satellite
ERS	European Remote-Sensing Satellites
ESDIS	Earth Science Data and Information System
ESMR	Electronically Scanning Microwave Radiometer
FAX	Fascimile
FGDC	Federal Geographic Data Committee
FIFE	First ISLSCP Field Experiment
FIFE	First ISLSCP Field Experiment
FIRE	First ISSCP Regional Experiment
FOS	Flight Operations Segment
ftp	File transfer protocol
GCDIS	Global Change Data Information System
GCMD	Global Change Master Directory
GEOS	Geodetic Earth Observation Satellite
GILS	Government Information Locator Service
GOES	Geostationary Orbit Environmental satellite
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
HazDat	Hazardous Substance Release/Health Effects Data base
HDF	Hierarchical Data Format

IDN	International Directory Network
ISCCP	International Satellite Cloud Climatology Project
ISLSCP	International and Land Surface Climatology Project
JERS	apan's Earth Resources Satellite
JPL	Jet Propulsion Lab
LAC	Local Area Coverage
LaRC	Langley Research Center
MAPS	Measurement of Atmospheric Pollution from Satellites
MSFC	Marshal Space Flight Center (MSFC)
MSS	Multispectral Scanner System
MSU	Microwave Sounding Unit
MTPE	Mission to Planet earth
NASA	National Aeronautics and Space Administration
NCDC	National Climate Data Center
NCDS	NASA Climate Data System
NDVI	Normalized Difference Vegetation Index
NGDC	National Geophysical Data Center
NOAA	National Oceanographic and Atmospheric Administration
NODIS	NSSDC On-line Data and Information System Services
NRIS	NASA Research Information Service
NSCAT	NASA Scatterometer
NSIDC	National Snow and Ice Data Center
NURE	National Uranium Resource Evaluation
ODL	Object Definition Language
OMTPE	Office of Mission To Planet Earth
ORNL	Oak Ridge National Lab
OTTER	Oregon Transect Ecosystem Research

PLDS	Pilot Land Data System
SAGE	Stratospheric Aerosol and Gas Experiment
SAM	Stratospheric Aerosol Measurement
SAR	Synthetic Aperture Radar
SCF	Science Computing Facility
SDPS	Science Data Processing Segment
SeaWIFS	Sea-Viewing Wide-Field of View Sensor
SEDAC	Socioenconomic Data Archive Center
SLAR	Side Looking Airborne Radar
SMMR	Scanning Multichannel Microwave Radiometer
SRB	Surface Radiation Budget
SSM/I	Special Sensor Microwave/Imager
SST	Sea Surface Temperature
STI	Scientific and Technical Information
TCP/IP	TelCommunications Protocol/Internet protocol
TM	Thematic Mapper
TOGA–COARE	Tropical Ocean and Global Atmosphere–Coupled Ocean Atmosphere
TOMS	Total Ozone Mapping Spectrometer
TOPEX	Ocean Topography Experiment
TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rain Measurement Mission
UARS	Upper Atmosphere Research Satellite
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
USGCRP	US Global Change Research Program
USGS	United States Geological Survey
USGS	United States Geological Survey

NASA GCDIS Implementation Plan

USMARC   United States Machine Readable Code

WWW   World Wide Web

Appendix B   Glossary

Access   The mechanism by which a user connects with data within a data system or center

Browse   Mechanism by which a user previews data prior to ordering

Connectivity   Mechanism by which a user communicates with a data system or center

Data delivery   Mechanism by which a user receives data ordered fro a data system or center

Data Set   A logical collection of data items based on source, geophysical parameter, coverage, time span, etc.

Interface   A point at which independant systems or diverse groups interact

Level of Access   Measure of quality of the connectivity, search, browse, order, or data delivery provided by a data system of center to a user.

Level of Service   Measure of quality of access to products or user support from individual data systems or centers

Node   Logical collection of data sets and systems based primarily on data center or physical location

Order   mechanism by which a user requests specific data sets from a data system of center

Search   Mechanism by which a user locates data within a data system or center

Service   Work or duties performed for a user; products or goods offered to a user

Standard   An accepted or commonly used norm

User   Individual or group that utilizes the services offered by GCDIS

NATIONAL SCIENCE FOUNDATION

GCDIS

IMPLEMENTATION PLAN

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The National Science Foundation (NSF) is one of the government agencies contributing to the interests, activities and goals of the United States Global Change Research Program (USGCRP). The USGCRP was established in 1988 and its current FY 1995 budget is approximately 1.8 billion dollars. Its goal is to establish the scientific basis for national and international policy making related to natural and human-induced changes in the global earth system and their regional impacts.

The research framework for the USGCRP consists of six elements: 1) Observing global change; 2) Managing global change data and information; 3) Understanding global change processes ; 4) Predicting global changes; 5) Analyzing the impact and consequences of global change; 6) Developing tools for assessing policies and options for responding to global change.

A major component of the USGCRP is the data and information produced by the programs, services and activities of the participating national and international agencies and organizations. The USGCRP supports data policies that foster full and open interchange of relevant government scientific research data and information for use by the broader global change community, including researchers, educators, industry and private citizens. In addition, the USGCRP supports a continuing commitment to the establishment, maintenance, validation, description, accessibility and distribution of high quality, long-term datasets.

To achieve this, the participating government agencies have cooperated to organize and develop a data and information system, the Global Change Data and Information System (GCDIS), to store, manage and distribute the information collected by the GCRP projects and agencies. GCDIS builds on the agencies' missions and resources, and links their data and information resources together and to the users. GCDIS will aid the user community in learning what key data and information holdings are available and readily accessible in useful formats.

The Global Change Research Program (GCRP) - Data and Information Implementation Plan of the National Science Foundation is a three-year plan that describes how the NSF will participate in the USGCRP - Global Change Data and Information System (GCDIS). All NSF-GCRP data and information is produced by NSF-funded investigators because the NSF does not conduct research directly.

1

It is expected that many NSF-GCRP investigators will produce data and information products that are of value to other researchers engaged in global change activities. These NSF-funded investigators must comply with the NSF data policy that requires them to include in their research proposals, a statement that data and information are expected to be a final product of their research project, a description of those products, the management plan for their validation, a description of the quality-control procedures, plans for their archival, and the budget for these data- and information- related activities. The data and information are expected to be provided to a publicly-accessible archive as soon as possible, but within two years after the completion of the project.

The NSF supports research centers. One of these, the National Center for Atmospheric Research (NCAR), archives, processes and distributes global change data and information for meteorological, oceanographic and climatological sciences.

Additionally, there are two data archive centers external to NSF-GCRP which the NSF supports and to which grantees provide their research-derived data. These are 1) the Inter-University Consortium for Political and Social Research (IPCSR), which archives human dimension global change data, individual and social attitude and behavioral data, and U.S. Census and other population data and 2) the Long Term Ecological Research Program (LTER), which archives ecological data. These, however, are not described in this report.

2. PURPOSE and SCOPE

The Global Change Data and Information Implementation Plan for the National Science Foundation is a three-year plan that describes: (1) the data archiving policy of NSF for Global Change Research Program data and information produced by its investigators; (2) the structure and services of the data center of the National Center for Atmospheric Research (NCAR), an NSF-supported research center that archives, manages and distributes meteorological, climatological and selected oceanographic data, and (3) the structure and services of the NSF and NCAR libraries.

At this time, NCAR is the only NSF-supported center that includes a large, publicly assessable data center that provides services to GCRP researchers. There are two data archives centers which are external to NSF-GCRP but supported by NSF: the Inter-University Consortium for Political and Social Research (IPCSR) and the Long Term Ecological Research Program (LTER). They are not described in this document

This Plan is organized into five sections (3-7). The section, Agency Overview, describes the NSF and its activities. Information on NSF-GCRP and its data and information management structure follows in the second section , with specific descriptions of its Data Policy, Data Prioritization Process, User Advisory Groups, Outreach Products, Budget and Schedule. The section National Center for Atmospheric Research (NCAR) describes the NCAR data center, with the following specific information: Description, Data Prioritization Process, Special Data Products, Outreach Data Products, International Data Products, User Advisory Group, Future Plans and Budget). Following that is a one page description of technical information on the data archive of NCAR and the NCAR Library: Content, Access, Interfaces, Standards, User Advice and Services, and Implementation Schedule. The section National Science Foundation Library describes the NSF Library. There is a List of Acronyms and a Table of Dataset Holdings as appendices.

3. AGENCY OVERVIEW

The National Science Foundation is an independent agency of the Federal government that was established in 1950 by an Act of Congress to promote and advance scientific, mathematics, and engineering progress in the United States and to ensure the Nation's supply of scientists, engineers and science educators.

The NSF accomplishes its mission by sponsoring research and education projects in the sciences, mathematics and engineering fields, which are proposed by individual investigators and groups at universities and academic consortia, not-for-profit research centers and institutions, private laboratories, and small businesses. The NSF funds successful proposals for research (approximately 20,000 awards each year to more than 2,000 colleges, universities, and other research institutions) primarily on the basis of their scientific merit. The NSF does not itself operate research laboratories but it does support national research centers and facilities. The NSF also supports cooperative research between university and industry and US participation in international scientific efforts.

The National Science Foundation is led by a Director and a National Science Board (NSB) composed of scientists, engineers, educators from universities, colleges and industries and other organizations involved in research and education. These are appointed by the President with advice and consent of the U.S. Senate. The research and educational programs are managed by nine Directorates and Offices at the National Science Foundation: Biological Sciences, Computer and Information Science and Engineering, Education and Human Resources, Engineering, Geosciences, Mathematical and Physical Sciences, Social Behavioral and Economic Sciences, Office of Polar Programs and Office of Science and Technological Infrastructure.

The National Science Foundation is located at 4201 Wilson Boulevard, Arlington, Virginia, 22230, Telephone: 703-306-1234; FAX 703-306-1250; Internet: http://www.nsf.gov/

Complete information on the National Science Foundation is available electronically through the Internet, on the NSF Home Page. The overview section on the NSF Home Page provides information on the agency's creation, mission, management organization, and has an interactive organizational chart and directory information and listings, and an alphabetical listing of the staff. Search capabilities are available for the staff listing. Location and directions to reach the NSF are available, via a DC area map and an interactive map of the local metro system.

Information about the programs and grants that NSF funds are available electronically on the NSF Home Page. They are listed according to program area, name, program deadline, and sponsoring directorate and division. Many of the NSF program announcements with guidelines, application information and grant proposal guidelines are available for viewing and searching.

Information on the NSF awards (including summary project abstracts in fully indexed text database) is available and can be searched by name and address of researcher, institution or organization, by date, by amount of award, award number and by topic.

NSF Publications (including the NSF Bulletin, press releases and features) are maintained in a searchable text database in ASCII format, which can be searched using WAIS (Wide Area Information Server) according to topic (free text) and publication number.

Research findings and results of grants supported by NSF are generally published in science and engineering journals or as reports prepared by the grantee institution. Publications issued by the NSF can be obtained from NSF, the Government Printing Office (GPO) or the National Technical Information Service (NTIS), by requesting the following information: publication number, title, number of copies and your name and full mailing address. In addition, through the use of Internet or a modem, NSF publications can be obtained through the NSF-Science and Technical Information System (STIS), from which a screen display can be printed onto a local printer, and a document can be sent by e-mail or downloaded immediately.

> NTIS 5285 Port Royal Road, Springfield, VA 22161, 703-487-4650.
> GPO   Superintendent of Documents, Government Printing Office, Washington, DC 20402, 202-783-3238
> NSF   NSF - Forms and Publication, 4201 Wilson Blvd., Rm. P15,
>   Arlington, VA 22230, 703-306-1130,
>   FAX   703-644-4278.
>   pubs@nsf.gov; stisinfo@nsf.gov

Specific focus areas, such as scientific trends and statistical information, news media and science education, of interest to the NSF are available and listed. In addition, information on NSF-funded research is featured, including the National Science Foundation - Global Change Research Program (NSF-GCRP) initiative.

4. DATA AND INFORMATION MANAGEMENT

4.0 Research Programs
The NSF-GCRP initiative is an aggregate of some 20 research thrusts. Most are interdisciplinary, international and collaborative research programs which use and may produce data and information from a variety of land- ocean and space-based observational systems and social and economic sources in order to identify and study changes in the earth's physical, human and ecological environments. The 20 NSF-GCRP research areas (listed below) address all the science policy issues and interdisciplinary areas of high priority to the USGCRP:

These programs are described in printed documents which can obtained by the methods mentioned in the previous section, Agency Overview, of this report.

Earth's Physical Systems
    World Ocean Circulation Experiment (WOCE)
    Climate Variability and Predictability (CLIVAR/TOGA)
    Ridge Interdisciplinary Global Experiments (RIDGE)
    Solar Influences
Biogeochemical Processes
    Global Tropospheric Chemistry Program (GTCP)
    Greenhouse Gas Dynamics (GCD)
    Joint Global Ocean Flux Study (JGOFS)
Biological and Ecological Processes
    Ecological Diversity Research
    Ecological Rates of Change (EROC)
    Global Ocean Ecosystems Dynamics (GLOBEC)
    Land Margins Ecosystems Research
Socioeconomic Systems
    Human Dimensions of Global Change (HDGC)
Integrative Analyses
    Arctic Systems Science (ARCSS)
    Water and Energy: Atmosphere, Vegetative, and Earth
    Interactions (WEAVE)
Historical Analyses
    Earth System History (ESH)
Observations and Management of Data on Earth System Change
    Stratospheric Ozone Depletion/Polar Ultraviolet Radiation
        Effects
    Sea Level Changes
    Geosystem Databases
Modeling and Prediction of Climate Change
    Climate Modeling, Analysis and Prediction (CMAP)

Options for Responding to Global Change
Methods and Models for Integrated Assessment (MMIA)

These NSF-funded research activities have explored such phenomena as global warming, ozone depletion, ultraviolet radiation, shrinking or growth of polar ice, desertification, reforestation, and other processes affecting biodiversity, effects of human activities on the levels of CO_2 in the Earth lower atmosphere (such as the use of hydrocarbon fuels for surface transportation, manufacturing, etc.), and the prediction of ENSO cycles 12-to-24 months in advance.

4.1 Data and Information Management Structure

The National Science Foundation supports the research goals and policies, and the data and information management activities and efforts by the USGCRP. The NSF itself, does not produce, archive nor distribute scientific data and information. However, the NSF has a data and information policy that applies to the funded research projects agency-wide. In 1995 a more specific data policy that applies to NSF-GCRP funded projects was adopted. The NSF-GCRP data policy does not drive the generation of data and information products but rather affects their quality, longevity and distribution.

4.1.1 Data Policy

The NSF agency-wide data management policy states that NSF expects its funded investigators to share the data, samples and physical collections that are produced by their studies. This must be done at no more than incremental cost and within a reasonable time (which usually means within two years).

In addition, where relevant, the NSF requires its GCRP-funded investigators to include the following information in their grant proposals: a statement that data and information products (including, but not limited to samples, physical collections and other supporting material) are expected to be a final product, a description of those products, the management and budget plan for their validation, quality control and archiving and the budget for these activities. This information is viewed as part of the basis for the normal NSF merit review and award negotiation process.

4.1.2 Data Prioritization Process

The NSF-GCRP data policy does not explicitly require investigators to identify and prioritize global change data and information products and needs.

4.1.3 Outreach Products

External to NSF-GCRP, the primary public outreach effort of NSF is to increase awareness of the importance of science and technology is the annual National Science and Technology Week, with press and teaching activities packets, magazine and posters. The teaching activities packets are designed for teachers

and educators, and are distributed through the NSTW Teacher Training and Materials Dissemination Network, a collection of 46 organizations (museums, universities, teacher training centers, community organizations) linked electronically on the Internet. This Network promotes National Science and Technology Week, by distributing materials, holding training workshops and hosting public events nationwide. The magazine Wonder Science describes additional physical science activities for children and adults.

NSF opened a new Exhibit Center in 1995. which contains exhibit space, classroom space and a computer work station with Internet connection. It shows several exhibits on NSF funded research, and other traveling exhibits, and also serves as a learning center, to which school children can visit and learn about the NSF science, mathematics and engineering research activities. It is located at the lobby level, North Side of the NSF, and is open to the public.

4.1.4 International Data and Information Products and Activities

NSF has bi-lateral and multi-lateral arrangements for data and information exchanges that are required to support its science and engineering activities and needs. These international data and information activities are distributed among many of the disciplinary areas within NSF. NSF is guided in the development and implementation of these arrangements by the data and information policies of the World Meteorological Organization (WMO) and the Intergovernmental Oceanographic Commission of UNESCO, which are based on full and open data exchange. (As an example of one of NSF's international data and information activities in the atmospheric sciences, see section 6.1.4 under NCAR.).

NSF, primarily through its Division of International Programs, has bi-lateral science and engineering research agreements with many countries around the world. These agreements usually include provisions that promote full and open exchanges of data.

4.2 User Advisory Process

The National Science Foundation is advised and helped by researchers from the science and engineering community and from industry who serve on formal committees or as ad hoc reviewers of proposals. This advisory system, which focuses on both program direction and specific proposals, involves more than 59,000 scientists and engineers annually.

4.3 Budget and Schedule

The specific NSF-GCRP data policy was adopted in FY 1995. Funding for its implementation will be made available to individual Principal Investigators (PIs) through their grant budgets. At this early stage in the implementation, no budget information is available.

One of the 20 NSF-GCRP research programs, Geosystem Databases, focuses on dataset development and data management activities. This program is intended to provide scientists with the necessary resources to assemble and use long term global climate change data and information efficiently and effectively for research and education, in order to better understand how the climate system functions. Funding for FY 1995 is about $1.4 million.

5. SYSTEM OVERVIEW AND DESCRIPTION

Selected data and information produced by NSF-supported researchers are archived at the institutions funding the principal investigators, federal data centers, e.g. the several NOAA national data centers, private data centers, e.g. the Inter-University Consortium for Political and Social Research, and, in the case of meteorological, climate and selected oceanographic data, at NCAR.

Sections 6 and 7 describe the NCAR data center and the NSF and NCAR libraries, the latter of which primarily serves its own staff and visitors doing business with their organization

6. NATIONAL CENTER for ATMOSPHERIC RESEARCH(NCAR)

6.1 Data and Information Management Description
The National Center for Atmospheric Research (NCAR) was established in 1960 by the University Corporation for Atmospheric Research (UCAR), a group of universities, and supported by the National Science Foundation to advance atmospheric and related sciences. The Data Support Section (DSS) of the Scientific Computing Division, one of NCAR's five scientific divisions, has a ten person staff that adds, maintains and distributes datasets, special data products and metadata (documentation and software programs).

6.1.1 Data Prioritization Process
NCAR responds to the needs of their users, their own predicted needs and consultations from UCAR and other panels to identify and prioritize global change data and information products and needs. They work on content and access of the data, and expand the amount of available data to keep pace with research needs. Most of the datasets are contributed from outside NCAR and are processed and enhanced by NCAR personnel.

6.1.2 Special Data Products
The DSS staff develops datasets projects which produce long-term records (more than 100 years) of atmospheric and oceanographic conditions. NCAR is also preparing, extending and improving its Comprehensive Oceanographic Atmosphere Datasets(COADS) for the reanalyses of global atmosphere project with NOAA. DSS staff also collects and distributes worldwide climate models outputs for global impact assessment studies.

The NSF (along with NCDC, NOAA and other agencies) supports the development of 4-D model assimilated datasets, for the creation of a 50-year retrospective climate record, and a 1000-year paleo record.

6.1.3 Outreach Data Products
NCAR produces outreach programs to educate students and improve communications among scientists. Beginning in 1994 and held annually, NCAR has hosted the Colorado Computation Science Fair with Colorado State University. Students can access NCAR facilities through University classroom grants. SCD staff distributes brochures on their datasets at national meetings.

6.1.4 International Data Products
NCAR is a participant in bi-lateral data exchange agreements with other countries to foster international cooperation and increase data resources and exchange, as has occurred with Russia, which were promoted by the Working

Group VIII Protocol. Similar programs have begun with China and are developing with Brazil.

6.1.5 User Advisory Group
The University Corporation for Atmospheric Research (UCAR), which is funded by the National Science Foundation (NSF), is responsible for the operations and management of NCAR. UCAR is governed by a Board of Directors, comprised of representatives from universities and research laboratories. A SCD Advisory Panel, comprised of UCAR representatives, meets annually to review the status and future plans of SCD and its data management activities, and offers suggestions and guidance to meet data and computational needs of atmospheric and related researchers, and national multi-agency projects. In addition, every 5 years, the NSF conducts a major peer review of all NCAR activities, offering advise on its SCD/DSS operations.

6.1.6 Future Plans
NCAR plans to continue the development of network tools that efficiently search (with automated query and keyword), browse and examine and display information data files. In addition, the DSS plans to collect and convert into digital format the older printed atlases, technical notes and documentation.

NCAR plans to produce CD-ROMs of datasets with time periods (including long- term) useful for atmospheric analyses and observations, and climate studies. As new low-cost media are developed, NCAR will use them to distribute the datasets that are too large for CD-ROMs or the existing network communications.

The integration of DSS information and data system with other NCAR and UCAR project systems was recognized as a need. Cooperative planning for a UCAR-NCAR data service system has begun through a data forum and workshop. Special efforts are focused on collecting data required by NSF funded researchers.

6.1.7 Budget (in Millions of Dollars)

YEAR	DSS $$	TOTAL NSF-NCAR Funds
FY1990	$ .46	$45.46
FY1991	$ .46	$48.87
FY1992	$ .76	$51.40
FY1993	$ .66	$50.17
FY1994	$ .71	$52.50
FY1995	$ .84	$58.38 est.

The budget for DSS services has increased from less than 1% to about 1.5%, of the total NSF funds to NCAR.

6.2 NCAR Summary

ORGANIZATION:
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR)

DESCRIPTION:
The National Center for Atmospheric Research (NCAR) was established in 1960
by the National Science Foundation and the University Corporation for
Atmospheric Research (UCAR), a group of universities to advance atmospheric
and related sciences.

The Center has five scientific divisions. The Scientific Computing Division,
includes the Data Support Section (DSS), which has a ten person staff to develop,
maintain and distribute data products. Other divisions maintain some specific
archives.

CONTENT:
There are more than 400 datasets which are searchable according to categories
and title. The types of global change data and information stored are
atmospheric, solar, physical environment and land surface properties,
climatological (including hydrology, clouds, and winds), oceanographic, model
output, satellite and geophysical datasets. The data is obtained as aircraft, ship,
upper air and satellites observations, and presented in grid, table and chart
formats, with time intervals ranging from hourly to monthly. (See Dataset
Holdings Appendix.)

ACCESS:
Information on the datasets and their parameters, and the data itself is available
in printed documents, Global Change Master Directory (GCMD), and with
WWW tools (Mosaic and Netscape). Connection to NCAR's data archive is
accomplished with T3speed. Datasets can be ordered according to datasets
reference number. They are distributed on 9 track tape, IBM cartridges, 8mm
cassette cartridge, CD ROM and ftp login and file transfer methods over
Internet.

Mail: NCAR Scientific Computing Division, Data Support Section
           Post Office Box 3000, Boulder, CO 80307-3000
Voice: 303-497-1215 (DSS); Fax: 303-497-1298 (DSS)
Internet: http://www.ucar.edu/metapage.html or
     http://http.ucar.edu/dss/index.html
           gopher.ucar.edu (NCAR/UCAR information)
           ftp: ncardata.ucar.edu (DSS anonymous login)

INTERFACES:
The metadata systems at NCAR are based on simple ASCII files and the available Internet tools (e.g. gopher and WWW search Mosaic or Netscape).

STANDARDS:
NCAR 5 terabyte data archive stores data in original format. FORTRAN Access software. Software is available for NCAR supercomputers, workstations, and PCs.

USER ADVICE and SERVICES:
The DSS staff, who are trained meteorologists and oceanographers, serve as dataset specialists and managers, answering queries about format, procedures, distribution and general documentation. A DSS staff specialist is assigned to each dataset.

The data archives are used by NCAR computing facility users, university researchers, government agencies, the private sector and research groups worldwide. DSS services more than 400 off-site data requests, and ships about 150 Gigabytes of data per year. On an average monthly basis, DSS transfers some 20,000 files from on-line information system in support of direct ftp requests and WWW searches. University, high school and K-12 grade students have recently used the datasets.

IMPLEMENTATION SCHEDULE

YEAR	CONNECT	SEARCH	BROWSE	ORDER	DELIVERY
1995	1	2	2	2	2
1996	1	2	2	2	2
1997	1	2	2	2	2

6.3 NCAR Library Summary

ORGANIZATION:
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH LIBRARY

CONTENT:
The NCAR library contains books, journals, printed maps and atlases, technical notes, and descriptions (metadata) of the NCAR data center holdings.

ACCESS:
NCAR library is accessible via on-line library catalog and key word search.
Copies of NCAR holdings can be obtained through interlibrary loan procedures.

Mail: National Center for Atmospheric Research Library
             Post Office Box 3000, Boulder, CO 80307-3000
Voice: 303-497-1180 (Library); interlibrary loan 303-497-1177
Fax: 303-497-1170 (Library)
Internet: telnet: 128.117.64.24
Email: ncarlib@ncar.ucar.edu
WWW: http://www.ucar.edu/library/libhome.html

USER SERVICES:
NCAR Library services include on-line library catalog and key word search, as well as other types of assistance for the staff.

7. NATIONAL SCIENCE FOUNDATION LIBRARY

DESCRIPTION/PURPOSE:
The National Science Foundation Library is in the Division of Administrative Services (DAS) of the Office of Information and Resource Management (OIRM), which provides a wide range of support for the day-to-day business of the organization.

CONTENT:
The National Science Foundation Library holdings consist of journals, books and reference sources. It houses 200 current journal titles, of which most are core journals of the sciences and some are in the general interest areas (such as public policy and automation). Most titles are retained for a period of 2-5 years.

There are approximately 10,000 volumes of reference materials housed in the reading room. These include directories, public documents, handbooks and selected books relevant to the NSF's overall mission and activities. The collection emphasizes science policy, history of science, and activities of public science agencies.

The Library has a small collection of science and reference databases available on CD-ROM, including the Science Citation Index with Abstracts and the Social Sciences Citation Index with Abstracts.

ACCESS:
Mail:	National Science Foundation Library
	4201 Wilson Boulevard, Room 225, Arlington, VA 22230
Hours:	Monday-Friday, 8am-5pm
Voice:	703-306-0658; FAX: 703-306-0250;
Internet:	library@nsf.gov

USER ASSISTANCE:
The National Science Foundation Library serves primarily the staff, researchers and visitors doing business with the NSF, providing reference assistance, searching on-line databases and retrieving documents from other libraries through interlibrary loan processes.

The Library is working to provide network-access to a selection of its CD-ROM holdings. It is also planning to provide the staff with desk-top acccess to a variety of scientific and reference databases via the Internet. Future plans include a searchable on-line catalog.

LIST OF ACRONYMS

ARCSS	Arctic Systems Science
BIO	Directorate for Biological Sciences
CEDAR	Coupling, Energetics, and Dynamics of Atmospheric Regions
CHP	Continental Hydrologic Processes
CISE	Directorate for Computer and Information Science and Engineering
CLIVAR	Climate Variability and Predictability Program
CMAP	Climate Modeling, Analysis and Prediction Program
COADS	Comprehensive Oceanographic Atmosphere Datasets
DAS	Division of Administrative Services
DSS	Data Support Section (NCAR)
EHR	Directorate for Education and Human Resources
ENG	Directorate for Engineering
EROC	Ecological Rates of Change
ESH	Earth System History Program
GCDIS	Global Change Data and Information System
GCMD	Global Change Master Directory
GCSS	GEWEX Cloud System Study
GEM	Geospace Environment Modeling Program
GEO	Directorate for Geosciences
GEODATA	Geosystem Databases
GGD	Greenhouse Gas Dynamics
GLOBEC	Global Ocean Ecosystems Dynamics
GPO	Government Printing Office
GTCP	Global Tropospheric Chemistry Program
HDGC	Human Dimensions of Global Change
IGAC	International Global Atmospheric Chemistry Program
IGBP	International Geosphere-Biosphere Programme
IPCC	International Panel on Climate Change
IPCSR	Inter-University Consortium for Political and Social Research
JGOFS	Joint Global Ocean Flux Study
LMER	Land Marine Ecosystems Research
LTER	Long Term Ecological Research Program
MMIA	Models and Methods for Integrated Assessment
MPS	Directorate for Mathematical and Physical Sciences
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center (DOC)
NOAA	National Oceanic and Atmospheric Administration
NSB	National Science Board
NSF	National Science Foundation

NSF-GCRP	National Science Foundation - Global Change Research Program
NSTC	National Science and Technology Council
NTIS	National Technical Information Service
OIRM	Office of Information Resource Management
OPP	Office of Polar Programs
RIDGE	Ridge Interdisciplinary Global Experiments
ROCEW	Role of Clouds, Energy and Water in Global Climate Change Program
SBER	Directorate for Social, Behavioral and Economic Sciences
SCD	Scientific Computing Division
Solar	Solar Influences Program
TOGA	Tropical Ocean-Global Atmosphere Program
UCAR	University Corporation for Atmospheric Research
USGCRP	U.S. Global Change Research Program
WAIS	Wide Area Information Server
WEAVE	Water and Energy: Atmosphere, Vegetative, and Earth Interactions
WOCE	World Ocean Circulation Experiment
WWW	World Wide Web

USDA GLOBAL CHANGE RESEARCH PROGRAM

IMPLEMENTATION PLAN

for

GLOBAL CHANGE DATA AND INFORMATION SYSTEM
(GCDIS)

U. S. Department of Agriculture

USDA Global Change Research Program
Global Change Data and Information System (GCDIS)
Implementation Plan

October 1, 1995

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UNITED STATES DEPARTMENT OF AGRICULTURE
GCDIS Implementation Plan

1.0 Executive Summary

The United States Department of Agriculture (USDA) Global Change Data and Information System (GCDIS) Implementation Plan is one of nine agency plans prepared by the Federal departments that are working together to enhance access to data and information from global change research through a distributed GCDIS.

The United States Department of Agriculture (USDA) plays a dual role in global change research related to the environment and natural resources. USDA agencies support agriculture, forestry, and ranching programs that ensure a continued and heathy food supply for the Nation and our trading partners throughout the world. At the same time, the USDA has a vital interest in and has responsibilities for the protection of private and public land to preserve it for future generations.

In carrying out its various missions, the USDA conducts research to better sustain agriculture and forestry in the United States and to provide technical assistance in managing private and public lands. Agriculture, forest, and grazing management are affected by weather, climate, and other environmental variables. USDA's global change research program focuses on understanding how global change factors affect U.S. and international forests, pastoral, and agricultural ecosystems, and how these ecosystems affect the environmental variables that contribute to global change. Included are basic research under the following scientific elements:

(1) climate and hydrology
(2) biogeochemical dynamics
(3) ecological systems and dynamics
(4) earth system history
(5) human interactions

USDA agencies maintain various centers of data and information that have been developed to support the mission programs of each agency. These programs include the areas of ecological systems and dynamics, biochemical dynamics, climate and hydrological systems, and human interactions with land use. The USDA is in a unique position of having substantial intensive long-term data and information relevant to global change and terrestrial ecosystems. The vast majority of USDA data and information of significant value to global change research were collected to support other agricultural programs, however, and do not carry an easily identified global change label. A major cooperative effort will be required to capture and incorporate these data and information into the global change research program.

2.0 Purpose and Scope

This GCDIS Implementation Plan for USDA is intended to educate global change researchers and assist agency implementation in sharing global change research data and information. It provides pointers to the relevant data assets in USDA agencies and to agency sites (nodes) where information about the data may be accessed.

The ability of users to access information through USDA agencies and their information nodes will transition increasingly toward online access because of advances in technology. However, the transition to such access will depend greatly upon availability of funding. The various levels of access to global change data and information have been described in the Appendix by generic standards for connectivity, search, browse, order, and delivery. A more complete definition of these levels can be found in the *U.S. Global Change Data and Information System Implementation Plan*.

3.0 Agency Overview

The United States Department of Agriculture (USDA) was established in 1862 by an Act of Congress "...to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants." It was to acquire and preserve "...all information concerning agriculture which could be obtained by means of books and correspondence, and by practical and scientific experiments, (accurate records of which experiments shall be kept...) by the collection of statistics, and by any other appropriate means..."

Two of the six mission areas of the Department include programs in support of research for the Global Change Research Program: the Under Secretary of Natural Resources and Environment, the Under Secretary for Research, Education, and Economics. Natural Resources and the Environment includes the Forest Service and the Natural Resources Conservation Service. The Research, Education, and Economics agencies are the Agricultural Research Service (including the National Agricultural Library), and the Cooperative State Research, Education, and Extension Service, the National Agricultural Statistics Service (NASS), and the Economic Research Service.

The ground-based global change research sponsored by USDA focuses on understanding terrestrial systems and the effects of global change (including water balance, atmospheric deposition, vegetative quality, and UV-B radiation) on food and fiber production in agricultural, forest and range ecosystems, and includes research on: interactions between terrestrial ecosystems and the atmosphere, the contributions of agricultural sources of methyl bromide to stratospheric ozone depletion and possible alternatives and substitutes for this fumigant; methane generation and nitrous oxide release; soil properties, including moisture, erosion, organic matter, nutrient fluxes and microbes; relationship of global change to forest and range fires, insects and plant

pathogens; agricultural management systems; and the ground truthing of satellite measurements.

USDA also sponsors research contributing to the assessment of global change effects on the agricultural food and fiber production systems, and on forests and forest ecosystems of the U.S. and worldwide. Programs include: long-term studies addressing the structure, function and management of forest and grassland ecosystems; research in applied sciences including soils, climate, food and fiber crops, pest management, forests, fish and wildlife, social sciences; implementation of ecosystem management on the national forests and grasslands; and human interactions with the natural resources.

4.0 Agency Data and Information Management

4.1 Management Structure

USDA does not plan to develop a centralized data center to maintain or archive global change information--data and Information management will remain the responsibility of USDA agencies to accomplish on a distributed basis. USDA Departmental emphasis will be on recommending useful and practical standards and protocols for collection management and standard product production and on coordination to promote effective access to these valuable data and information resources. The goal is to maintain distributed data and information systems that will appear fully integrated to the user.

4.1.1 The nodes for data and information from focused global change research are:

Current Research Information System (CRIS)
Agricultural Research Service (ARS)
Cooperative State Research, Education, and Extension Service (CSREES)
Economic Research Service (ERS)
Forest Service (FS)
Natural Resource Conservation Service (NRCS)

4.1.2 Nodes for the contributing data are the same agencies identified above as nodes for focused global change research and the following:

National Agricultural Library (NAL)

4.2 User Advisory Process

The USDA nodes for data and information from focused global change research and from contributing programs have a number of formal and informal mechanisms for obtaining user advice on their data and information needs. USDA nodes provide data and information that is used in national, state, and local planning, university research, private sector analysis, and by the general public. User comments and suggestions

through direct interaction through in-person or written communication. In those instances where metadata and information is made available through electronic access via the Internet, World Wide Web servers, gopher servers, and BBS, provisions are included to facilitate user suggestions.

In some instances, nodes are implementing formal Customer Service Plans to identify direct and indirect customers through a variety of means and adjusting services to better meet user needs. USDA has also established a USDA Global Change Task Force under the USDA Global Change Research Program Office which includes USDA representatives that participate in interagency data management activities of the Global Change Research Program and will act as a conduit for sharing feedback received from the other participating agencies.

4.3 K-12 Education Programs

USDA has significant responsibility for formal education efforts in the food, fiber, and agricultural sciences. To fulfill these responsibilities, USDA has established three major programs that focus on global change issues and contribute to the goal of developing human resources. The USDA National Graduate Fellowships Program funds fellowships in the area of environmental science and conservation management; the Competitive Institution Challenge Grants Program provides funding for curriculum design and materials development, faculty preparation and enhancement, teaching methods and teaching systems, student hands-on learning, student recruitment and retention, and scientific instrumentation for teaching; and the 1890 Institutions Building Grants Program provides funds to develop enhanced abilities in environmental education programs related to global change.

Education programs developed at the Land-Grant universities are implemented on either a statewide or county-by-county basis and USDA provides Federal funding that enables the States to meet national objectives and local needs. Continuing and informal education programs are a force for increasing understanding and changing behavior to limit, mitigate, and adapt to global change, as needed.

USDA recently entered into an agreement with the National Future Farmers of America Foundation and the National Council for Agricultural Education to enhance agricultural education, in its broadest sense, in K-12 public schools. To implement the agreement, USDA has established a Departmental Agricultural Education Long-Range Planning Committee chaired by the Under Secretary for Research, Education, and Economics. In February 1995, the Committee initiated a Department-wide survey to identify USDA programs and services that support agricultural educators and to assess the needs for an outreach network with agricultural educators, with a focus on the K-12 public schools.

USDA is also committed to enhancing global change education among native americans. In November 1994, the DC Reference Center Branch Library of the National Agricultural Library and a member of the University of Nebraska faculty conducted a two-day workshop at Haskell Indian Nations University in Lawrence, Kansas to design culturally appropriate curriculum materials related to global change. USDA also organized several K-12 educational efforts for the American Indian Earth Day Program held in 1995.

4.4 Implementation Schedule

Metadata on holdings from the focused and contributing research programs within USDA agencies will be provided through the GCMD, the USDA portion of the CIESIN Catalog, and at the agency information service nodes described later in this document. Although efforts will be made to increase the number of datasets maintained online, the availability of data will be contingent upon funding for global change data and information management. USDA Internet access points are shown in the Appendix to this plan.

4.5 Agency GCDIS Information Nodes: The USDA GCDIS Information Nodes are shown on the following pages.

Organization: USDA Current Research Information System (CRIS)

Description: Over 30,000 agricultural and forestry research projects of USDA and state agricultural research agencies, the State Agricultural Experiment Stations, the state university landgrant system, and other cooperating state institutions.

Content: Soil, water, forest, and range resources; crop protection; biological efficiency and production systems; marketing of crop, animal, and forest products; foreign trade adn market development. Food and nutrition, health and safety, an consumer protection; rural development; farm and forest product development; fish and wildlife management, outdoor recreation, pollution, and environmental quality.

Access: WWW: http://www.sura.net/main/members/usda.shtml
           Gopher (searchable database): gopher.nalusda.gov:70/11/ag-pubs/cris
      Commercial Online: DIALOG Information Services, Inc, Marketing Department, 3460 Hillview Ave, Palo Alto, CA 94304, (800) 334-2564
           Commercial CD-ROM: SilverPlatter, 100 River Ridge Drive, Norwood, MA 02062,

Interfaces: Internet, Telephone, FAX, postal service

Standards: Internet protocols

User Assistance: For further information or priorities for in-house searches on behalf of federal, state, and local government organizations and educational institutions is shown below. Requests from private organizations and the public are referred to commercial search services. Search aids and training on DIALOG and CRIS searches are available.

    Director, Current Research Information System
    Cooperative State Research, Education, and Extension Service
    National Agricultural Library Building, 5th Floor, Beltsville, MD 20705
    Email: cris@nalusda.gov (Internet), !a22cris (FTS2000MAIL), or CRIS on DIALCOM

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	1	1	1
Order	4	4	4
Delivery	4	4	4

Organization: Agricultural Research Service (ARS)

Description: The Agricultural Research Service (ARS) global change research program focuses on the physical, chemical, and biological processes linking the performance of the agricultural system to environmental variables (such as radiation intensity and quality, atmospheric trace gases concentrations(especially carbon dioxide and ozone), temperature, humidity, and rainfall) expected to be affected by global change. This includes interactions among environment, plant, animal, and soil systems. This understanding is captured and quantified in system models which provide a framework to organize the data and mathematical descriptions of various climate-related processes.

Content: The ARS focused research program is carried out in 15 locations throughout the United States, Each location has printed material available as research papers, proceedings, and other technical publications. A central contact point for this work is the National Program Leader for Global Change located in Beltsville, Maryland. ARS also has several locations that have long-term records that are valuable for research in global change but that are not funded under the GCRP, which are considered "contributing data."

Access: Users can obtain the available printed information from the individual research locations or through the National Program Leader by contacting them by phone, FAX, or Internet. Data access will be on a voluntary basis, and can best be accomplished by contacting the individual investigators. Metadata that describes ARS global change databases is available at the following sites:

      URL: http://gcmd.gsfc.nasa.gov
      URL: http://forte.poly.edu:3333/ (CIESIN Searchable Database)
      URL: http://www.sura.net/main/members/usda.shtml (CRIS database)
      URL: http://gcmd.gsfc.nasa.gov (LTER data)

Interfaces: Telephone, Internet access, postal service

Standards: Internet protocol

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	1	1	1
Order	4	4	4
Delivery	4	4	4

Organization: Cooperative State Research, Education, and Extension Service (CSREES)

Description: CSREES links resources of the Nation's agricultural experiment stations in all 50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, and Micronesia. CSREES also administers the National Research Initiative Competitive Grant Research Program (NRICGRP), which, in part, provides grants focused on global change topics.

Content: Over 30,000 ongoing and recently completed agricultural and forestry research projects conducted primarily within the USDA and State university research system, including the latest progress reports and lists of recent publications coming out of the research. Datasets are not presently available from the NRICGRP.

Access: WWW: http://www.sura.net/main/members/usda.shtml
 Searchable Gopher: gopher:.nalusda.gov:70/11/ag-pubs/cris
 Commercial Online Access: DIALOG
 Commercial CD-ROM: SilverPlatter

Interfaces: The UV-B Monitoring Network is part of the U.S. Interagency UV-Monitoring Plan, which coordinates all Federal agencies involved with UV-B measurement and monitoring, to include international UV monitoring activities being coordinated through the World Meteorological Organization (WMO). Access the USDA UV-B Radiation Monitoring Program (research and climatological networks) at-- http://uvb.nrel.colostate.edu:80/uvb/

Standards: Internet protocol

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	1	1	1
Order	4	4	4
Delivery	4	4	4

Organization: Economic Research Service (ERS)

Description: Economic analysis of agricultural commodity markets and trade, rural economic development, advancing agricultural technology, and resource use. Assessment, simulation, and predictive models capable of analyzing agricultural sector response to changing policy, environmental and resource constraints, technologies, and macroeconomic conditions.

Content: Global change assessments focus on how human interactions are likely to shape the response of food systems to climate change. Over 118 data products on human response to global change issues on PC diskettes, CD-ROM, and Internet. These include databases describing input use in US agriculture, value of farm land and assets, irrigation use and cost, and major land uses. Global databases that might be useful in climate change research include world agricultural trade flows and world agricultural trends and indicators.

Access: ERS data products are described in the USDA publication, *Reports: Agriculture-Economics* (published annually with fall and spring supplements) and are available in electronic form and many are available in printed material.

      URL: http://gcmd.gsfc.nasa.gov
      Phone : 1-800-999-6779 (orders only) and 1-703-834-0125 (customer service).
      WWW : gopher://usda.mannlib.cornell.edu
      Mail   : ERS-NASS, 341 Victory Drive, Herndon, VA 22070
      Gopher : usda.mannlib.cornell.edu
      Telnet : usda.mannlib.cornell.edu. Log in as "usda" (no password is needed).
      FTP   : usda.mannlib.cornell.edu. Login as "anonymous with ID name or e-mail address as password, then cd usda. There is no charge to access ERS data products on Internet.

Interfaces: Telephone, Internet access, postal service

Standards: Materials are available in a variety of printed and electronic forms.

User Assistance: ERS Customer Service, Room 208, ERS-USDA, 1301 NY NY Ave NW, WASH, D.C. 20005-4788, (202) 219-4060; FAX -0044; service@ers.bitnet.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	1	1	1
Delivery	1	1	1

Organization: U.S. Forest Service (FS)

Description: All FSGCRP projects contribute to one or more of the four major national program elements: atmosphere/biosphere gas and energy exchange program (ATBIOX), which examines the way climate and atmospheric chemistry impact; Disturbance Ecology (DISTUR), which assesses the potential impact that increased occurrences and severity of fire, insects, and disease episodes may have on forest ecosystems; Ecosystem Dynamics ECODYN), which focuses on the response of terrestrial or aquatic ecosystems to global change, analyses the plant and animal composition of the system--including threatened and endangered species--evaluates water quality and quantity, and assess environmental impacts on vegetation and soils; and Human Activities and Natural Resource Interactions (HUMANI), which addresses the way global change will impact human activities and how human activities--through agriculture and resource management--in a changed environment will affect forest and range lands.

Monitoring activities provide the baseline information for describing current resource conditions and trends. FS monitoring programs of particular relevance to global change issues include include Forest Inventory and Analysis (FIA), Forest Health Monitoring (FHM), and monitoring activities at long-term ecological research sites. The FS also conducts long-term intensive monitoring of selected forest ecosystems such as the established programs at the Hubbard Brook Experimental Forest, the Coweeta Hydrological Laboratory, Fraser Experimental Forest, and the H.J. Andrews Experimental Forest. Monitoring and research activities at intensive sites will provide critical input to global change assessments as well as guide design of new research studies contributing to model development.

Content: Research papers, proceedings, technical reports, assessments, progress reports, and bibliographies. Climate reconstructions, forest growth modeling at several different scales, paleovegetation dendrochronology techniques, forest growth modeling, paleovegetation changes, assessments of the role of forest systems in mitigating climate change, trace gas dynamics (ozone, nitrogen oxides, carbon dioxide) in forest ecosystems, the interaction of pollutants and snow, geomorphology, respiration of conifer ecosystems, cold hardiness and elevated carbon dioxide in forest systems, fire disturbance modelling, fire emissions, land use changes, national modeling of climate changes on the forest sector.

Access: Since global change will be felt most acutely at regional levels, global change research within the Forest Service is conducted through five regional programs, which constitute separate nodes for global change data within the FS. Global change data and information should be obtained through the Regional Offices whose holdings are described in the next five pages of this document rather than from the national coordinatiing office. Metadata on global change databases within the FS is included in a searchable database maintained by CIESIN at the following URL: http://forte.poly.edu:3333/

    Pacific Region
    Interior West Region
    Northern Region
    Southern Region
    Forest Products Laboratory

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Organization: Pacific Region, U.S. Forest Service

Description: The Pacific Region includes Alaska, California, Hawaii, Oregon, Washington, and the Pacific Islands. The GCRP for this region has identified four high priority ecosystems for its research: the Boreal Forest, the Moist Temperate Conifer, Mediterranean (chaparral), and the Dry Temperate Forest (ponderous pine) types. The research in this region emphasizes better understanding and management of the interactions between climate change, air chemistry, and ecosystem processes and productivity in these ecosystems.

Content: Available off-line in various electronic forms. MAPSS (Mapped Atmosphere Plant Soil System) vegetation-distribution and stream-flow simulations under various climate scenarios; Climate scenarios; WINFLOW surface-winds simulations; FIA (Forest Inventory and Analysis) data; TAMM/ATLAS model runs of timber projections under many scenarios; and other various data sets on intensive ecological research in the five Pacific States, Mexico, and Brazil.

Access: Pacific Global Change Program, 3200 SW Jefferson,
          Corvallis, OR 93733
          TEL: 503-750-7429   FAX: 750-7329
          kempb@ccmail.orst.edu

Interfaces: Other regional FSGCRP programs, NASA, NCAR. Participates in the "VEHMAP" model intercomparison study. International interface with Brazil (IBAMA) and Mexico (INIPAP Project 618) national databases.

Standards: Primarily C and Unix-based modeling and databases. Arcinfo.

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	4	4	4
Delivery	4	4	4

Organization: Interior West Region, U.S. Forest Service

Description: The 14-state Interior West covers 36 percent of the land area of the United States and is arid to semi-arid. Special emphasis is placed on: alpine and subalpine coniferous forests; woodland and grassland ecosystems; understanding disturbance processes--especially of fire, insects, and diseases and their interactions; water resources; national planning; and modelling.

Content: Printed research papers, proceedings, technical reports, assessments, progress reports, and bibliographies. Climate reconstructions for the central Rockies using dendrochronology techniques, forest growth modeling at several different scales, paleovegetation for the central Rockies using dendrochronology techniques, forest growth modeling at several different scales, paleovegetation changes in the Great Basin, genetic variability of junipers in the Great Basin, assessing the role of fragmented linear forest systems in mitigating climate change on the Great Plains, trace gas dynamics (ozone, nitrogen oxides, carbon dioxide) in alpine and subalpine ecosystems, development of a high resolution climatic dataset for the Northern Rocky Mountains, the interaction of pollutants and snow, geomorphology, respiration of conifer ecosystems, cold hardiness and elevated carbon dioxide in coniter systems, fire disturbance modelling, fire emissions, land use changes in the Colorado Mountains, national modeling of climate changes on the forest sector, and mountain pine beetle disturbance and climate change.

Access:

> Interior West Region, USDA Forest Service
> 240 West Prospect, Fort Collins, CO 80526
> TEL: 303-498-1231 E-mail: S=L.JOYCE/OU1=28A@mhs-fswa.attmail.com

Interfaces: Internet, phone, FAX, postal service.

Standards: Operating System: DOS, Windows, Unix, OS. Formats: Computer languages: Fortran, Basic, C, C++. Media: disk, 9-track, CD-ROM.

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	4	4	4
Delivery	4	4	4

Organization: Northern Region, U.S. Forest Service

Description: Forest resources of the Northeastern, North Central, and Midwestern United States. Climate change, air pollution and acidic deposition exert strong influences on forest ecosystems in the Northern region. Gradients of moisture and temperature are supplemented by strong pollutant deposition gradients, generally from near natural levels in the West to the highest levels in the United States in the East. Climate and pollution stresses and their interactions with pests, humans, and other environmental changes, are likely to cause cumulative and unprecedented effects on northern forest ecosystem processes.

Content: Printed research papers, proceedings, technical reports, assessments, progress reports, bibliographies, maps, and informational brochures. Research areas include air pollution stress on trees, forest ecosystem effects on acidic deposition, landscape level studies and the effects of human interactions and economics. The U.S. forest carbon budget, develop regional and national models for predicting global change effects on forest ecosystems, and assessments to synthesize research results to address policy questions. We are compiling a catalog of long term data sets that will have descriptions, details of the data set, data storage format, and the scientist to contact. Efforts are underway to centralize and archive long term research data sets from northern experimental and national forests of the FS in electronic form. Off-line electronic formats include disks, 9-track and DAT tape.

Access: Research data is usually seen as the intellectual property of the scientists and are usually not available until their work is published.

> Northern Region, USDA Forest Service, 5 Radnor Corporate Center, Suite 200,
> 100 Mattsonford Road, Radnor, PA 19087, TEL: 215-975-4092

Interfaces: Telehone, FAX, postal service, Internet.

Standards: Computer languages: Fortran, Basic, C. Software: TCP/IP, X Windows, CEO (DG), and with Project 615-ArcInfo for GIS, Mosaic/Pipeline. Hardware: DOS, Unix, AOS/CEO (DG) based. Media: disk, DAT, 9-track, CD-ROM

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	4	4	4
Delivery	4	4	4

Organization: Forest Products Laboratory (FPL), U.S. Forest Service

Description: Research aimed at enhancing the effective use of forest products and publishes its findings for government, industry, and the consumer. The focus is on the Atmosphere/Biosphere Gas and Energy Exchange and Human Interactions elements of the national program. Some of data is related to the direct reduction of greenhouse gas emissions as in the development of wood finishes with lower concentrations of volatile organic chemicals.

Content: Holdings emphasize conservation of energy through efficient use of forest products. Other specific topics related to Global Change impacts include reports on alcohol from wood research, reduction of volatile organic chemicals in wood finishes, and water-borne preservations for wood.

Access:

> Forest Products Laboratory, One Gifford Pinchot Drive, Madison, WI 5307-2398:
> FAX (608) 231-9592, telephone at (608) 2331-9353.
> E-mail: s=j.zerrbe/ou1=s32a@mhs-fswa.attmail.com
> Future interactive access will be provided via gopher.

Interfaces: Internet, phone, postal service.

Standards: The FPL can supply DOS-based ASCII formatted material.

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	4	4	4
Delivery	4	4	4

Organization: Southern Region, U.S. Forest Service

Description: Upland pine and mixed pine-hardwood forests, pine flatwoods and savannahs; coastal maritime forests, pocosins, cypress-tupelo swamps and mangrove forests; bottomland hardwoods; upland hardwoods; and Southern Appalachian spruce-fir forests. The forests are subject to numerous physical and chemical stresses. Weather conditions play a major role in determining stand growth, insect and disease outbreaks, production costs, regeneration success, and accessibility for management or recreation. Drought, nutrition, and high temperature are three major factors that limit forest health and productivity. Factors making up the chemical climate also have an effect. Ozone occurs at levels that have been shown to cause foliar injury, physiological alterations, and reductions in growth of several forest species.

Content: Printed research papers, proceedings, technical reports, assessments, progress reports, bibliographies, maps, and informational brochures. Decades of research on the biology, ecology, physiology, and morphology of southern forests provides a foundation for addressing current concerns about forest health.

Access: Data access will be on a voluntary basis, and can best be accomplished by contacting the individual investigators. Research data is considered the intellectual property of the scientists and are usually not available until their work is published. We have an extensive research library.

> Southern Region, USDA Forest Service, 1509 Varsity Drive, Raleigh, NC 27606
> TEL: 919-515-3311

Interfaces: Internet, phone, FAX, and postal service.

Standards: Software: Windows, CEO (DG). Hardware: DOS, AOS/CEO (DG)-based. Many of our processing platforms are DOS machines that communicate with the Data General system. Media: disk.

User Assistance: See Acess paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	4	4	4
Delivery	4	4	4

Organization: National Resources Conservation Service (NRCS)

Description: NRCS has collected, analyzed, mapped, and inventoried most of the privately owned land in the United States. Various soil databases are significant for testing, evaluating, and extrapolating simulation modeling results to geographical locations of interest. Work is underway on national and international soil maps and a reference soil classification system to support global evaluations of soil degradation, productivity, and fragile lands. Additional work on quantitative models of soil formation involves both landscape-forming processes and soil-forming processes that relate to historical climate changes. NRCS's major data centers, which have soil, climate, plant, and hydrologic data can be accessed through the NRCS World Wide Web server, which essentially provides one-stop shopping capability.

Content: National, state, and county soil survey, physical & chemical pedon characterization, map unit interpretation, world soils mapping and interpretations. Mainly on agricultural lands. Spatial data are available by Major Land Resource Area, County, and hydrologic unit code.

Access:

> WWW Home page: http://www.ncg.scs.usda.gov/ Catalog, sample images, interpretations, and ordering forms are available online.
> Phone: (Data ordering and price information): 1-800-672-5559
> County soil surveys are available book-formats from the county NRCS offices. Electronic data are distributed mainly on CDROM, ISO 9660 format.

Interfaces: Internet, phone, FAX, postal service.

Standards: World Wide Web, CDROM: KISO 9660 format and sometimes UNIX to enable GIS users to browse geospatial data and DOS versions of certain ISO 9660 disks. Vector data are distributed in a DLG-3 optional format, as ARC/INFO coverages, and as GRASS vector data within GRASS Mapsets. Raster data are distributed in a GRASS raster format. Site or point data are usually flat ascii files with x and y locator coordinates next to an attribute. Attribute data are often ascii, pipe or tab delimited files.

User Assistance: See Access paragraph, above.

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	4	4	4
Browse	3	3	3
Order	2	2	2
Delivery	4	4	4

Organization: National Agricultural Library (NAL)

Description: A National Library of the United States and the Library of the U.S. Department of Agriculture. As the Nation's chief resource and service for agricultural information, NAL's mission is to increase the availability and use of current agricultural information among researchers, educators, policy makers, producers and consumers of agricultural products, and the public.

Content: The NAL collection is over 2 million volumes: primarily print materials (although NAL is in the process of a transition to provide electronic access to more information). The general collection covers all aspects of agriculture, including environmental and natural resources, terrestrial ecosystems, botany, crop production, plant production and protection, forestry, entomology, animal production, veterinary science, aquaculture, agricultural engineering, soil sciences, human nutrition and ecology, farm management, rural sociology, and biotechnology. NAL's extensive serial collection contains over 27,000 current journals, periodicals and other serials in 40 languages.

Access: WWW Server: http://www.nal.usda.gov
Gopher: gopher.nalusda.gov
ALF (Agricultural Library Forum) Electronic Bulletin Board System:
Dial-up (301-504-5497)
FedWorld (telnet fedworld.gov)

Interfaces: WWW, gopher, Internet E-mail, FTS2000MAIL

Standards: USMARC, Internet protocols

User Assistance: National Agricultural Library
10301 Baltimore Boulevard
Beltsville, MD 20705-2351
TEL: (301)504-5755; Fax: (301)504-5472

EMail: For an automated response on all services available at NAL, send a blank E-mail message to: info@nalusda.gov

Implementation Schedule:

Function	FY 1995	FY 1996	FY 1997
Connectivity	1	1	1
Search	1	1	1
Browse	2	2	2
Order	1	1	1
Delivery	1	1	1

Organization: Other USDA Global Change Libraries and Information Centers

Description: In addition to the National Agricultural Library, its 11 information centers and its DC Branch Reference Library, USDA agencies have 46 other libraries and information centers with global change information resources, most of which are open to the public.

Content: Their holdings cover all aspects of agriculture, including environmental and natural resources, terrestrial ecosystems, botany, crop production, plant production and protection, forestry, entomology, animal production, veterinary science, aquaculture, agricultural engineering, soil sciences, human nutrition and ecology, farm management, rural sociology, and biotechnology.

Access: Information on how the holdings and services available from each of these libraries and information centers can be accesses may be obtained electronically from the Global Change Data and Information System (GCDIS) World Wide Web Server:

WWW URL: http://www.gcdis.usgcrp.gov/gcdis//library.html

Interfaces: Internet connectivity and other interfaces are provided for each library/information center.

Standards: USMARC

User Assistance: User assistance and services are included in the description for each library/information center.

5.0 Acronym List

AGRICOLA	*Agricultural Online Access*
ALF	Agricultural Library Forum
ARGIS	Active Response Geographic Information System
ARS	Agricultural Research Service
ATIBOX	Atmosphere/Biosphere Gas and Energy Exchange Program
CD-ROM	Compact Disc-Read Only Memory
CES	Cooperative Extension Service
CIESIN	Consortium for International Earth Science Information Network
CO_2	Carbon Dioxide
CRIS	Current Research Information System
CSREES	Cooperative State Research Service
CSUNREL	Colorado State University Resources Ecology Lab
DISTURB	Disturbance Dynamics
DG	Data General
ECODYN	Ecosystem Dynamics
EPA	Environmental Protection Agency
ERS	Economic Research Service
FAO	Food and Agriculture Organization
FD	Floppy Disk
FHA	Forest Health Monitoring
FIA	Forest Inventory and Analysis
FPL	Forest Products Laboratory
FS	Forest Service
GIS	Geographic Information System
GCDIS	Global Change Data and Information System
GCRP	Global Change Research Program
HNRIMS	Human Nutrition and Information Management System
HUMANI	Human Activities and Network Resource Interactive
ISU	Iowa State University
MMS	Modular Modeling System
NAL	National Agricultural Library
NASS	National Agriculture Statistics Service
NRCS	National Resource Conservation Service
NRICGRP	National Research Initiative Competitive Grant Research Program
TCP/IP	Transmission Control Protocol/Internet Protocol
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USGCRP	United States Global Change Research Program
UV-B	Ultra Violet Radiation-B
WMD	World Meteorological Association
WSRO	World Soil Resources Office

6.0 Glossary

ATIBOX: Controlled experiments to determine the effects of increased carbon dioxide, ozone, and other environmental stresses and their interactions on carbon allocation, growth processes, and other plant responses, including interactions with insects. Measurements of elemental cycling and gas fluxes at intensive research sites along climatic and deposition gradients. Observations to estimate the effects of management intensity on carbon storage in urban, suburban, and rural forest soils. Interpretation of general circulation models of the atmosphere to develop regional scenarios of climate, weather, and disturbance changes and development of mesoscale modeling techniques to improve regional prediction.

DISTUR: Development of models of expected changes in the frequency of insect outbreaks due to prospective changes in climate. Experimental and observational studies to better understand the role of pathogens and interactions with other stresses in affecting forest health and the sustainability of forest ecosystems.

ECODYN: Development of models to predict site-specific pollution stress and to predict regional pollution stress as a function of expected climate and weather changes. Experiments and observations that will lead to understanding forest floor aluminum and calcium chemistry, changes in tree tolerance to weather extremes, and changes in nitrogen uptake and allocation. Research will lead to predictions of changes in the reproduction, distribution, and relative abundance of important forest tree species. Research on the regional effects of climate change and air pollution on hydrology, wildlife habitat, and forest growth. Research to better understand genetic responses and potential adaptability of species and genotypes to prospective change.

Forest Inventory Analysis (FIA): Periodic, comprehensive statewide inventories of forest resource conditions.

Forest Health Monitoring (FHM): A program involving a partnership of Forest Service Research, Forest Service State and Private Forestry, State Forestry Organizations, that the Environmental Protection Agency (EPA). FHM is deigned to detect changes in forest resource conditions, evaluate possible causes of changes, and increase our ability to anticipate changes in forest resource conditions.

Global Change Data and Information System (GCDIS): A set of individual agency data and information systems supplemented by a minimal amount of crosscutting new infrastructure, and made interoperable by use of standards, common approaches, technology sharing, and data policy coordination. The GCDIS user community extends from global change researchers to other researchers, policy makers, educators, private industry, and private citizens.

HUMANI: Linking a model of the Nation's forest carbon budget with an economic forest sector model to evaluate alternative national policies for mitigating and adapting to climate change. Providing estimates of expected changes in forest resource outputs an values as a consequence of expected changes in forest health, productivity, and well-being to adapt management decision models to incorporate the effects of environmental changes on multiple resource outputs.

APPENDIX

GCDIS Access Levels

Function	Level 1	Level 2	Level 3	Level 4
Connectivity	Data transfers to 1 Megabit per second	Data transfers to 1 Megabit per second	Voice-grade telephone line	Regular mail
Search	Catalog system online with info from agencies described by GCDIS stds	Directory level info and agency documentation online to GCDIS stds	Priority info directory level info and hardcop documentation to GCDIS	Existing dir level info & hardcopy documentation available to GCDIS stds
Browse	Online product generation	Online static browse products	Offline digital browse products	Offline hardcopy browse products
Order	Online GCDIS integrated	Online with manual forwarding	Manual interface	Manual interface
Delivery	User choice, on/off line via std formats	User choice, on/off line standard products	User choice of standard products	User choice of standard products